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IMPERIAL MINERAL RESOURCES  
BUREAU.

THE MINERAL INDUSTRY OF  
THE BRITISH EMPIRE  
AND  
FOREIGN COUNTRIES.

WAR PERIOD.

COAL, COKE, AND  
BY-PRODUCTS.

(1913-1919.)

PART III.



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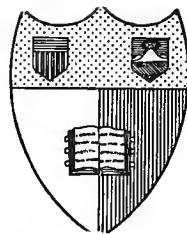
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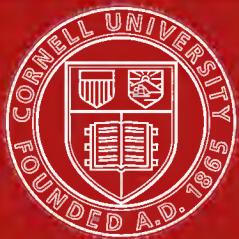
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### LIST OF SKETCH MAPS.

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- France, Belgium, Netherlands and Western Germany.  
 Austria, Eastern Germany and Hungary.  
 Norway, Sweden and Russia-in-Europe.  
 Spain and Portugal.  
 Italy.  
 United States.  
 South America.  
 China with Korea and Formosa.  
 Japan.  
 Russia-in-Asia (including Japanese Sakhalin).

### INTRODUCTORY NOTE.

The general preface to the part of the Annual Mineral Conspectus of the Bureau which relates to Coal appeared in Part I. The present work is Part III, and comprises general and statistical information as to Coal, Coke and By-products in respect of Foreign Countries.

The values, as recorded by the various countries, have been converted into British currency by use of the average rates of exchange between each country and the United Kingdom, where trustworthy figures are available. In other cases the conversions have been made at the par rates of exchange.

The Bureau is indebted to the Federation of British Industries for supplying the following average yearly rates of exchange which have been used in the conversions :—

To the £1 British currency.

—	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Belgium (franc) ...	25·22	25·22	25·22	25·22	25·22	25·22	25·22
France (franc) ...	25·22	25·22	26·46	28·05	27·47	26·78	32·24
Greece (franc) ...	25·00	25·00	25·13	24·73	24·67	24·80	24·35
Italy (lira) ... ...	25·22	25·22	28·79	31·32	35·77	36·97	39·12
Netherlands (gulden) ...	12·11	12·11	11·68	11·43	11·37	10·13	11·28
Portugal (escudo) ...	4·53	4·53	6·76	7·05	7·64	7·76	8·40
Spain (peseta) ...	25·22	25·22	24·89	23·86	21·12	19·37	22·27
Sweden (krone) ...	18·15	18·15	18·28	16·53	14·57	14·46	17·39
Switzerland (franc)	25·22	25·22	25·39	24·89	22·70	20·77	23·32
United States (dollar).	4·866	4·866	4·73	4·77	4·764	4·766	4·389
Indo-China (franc) ...	25·22	25·22	26·46	28·05	27·47	26·78	32·24
Japan (yen) ...	9·8	9·8	9·79	9·47	9·33	9·12	8·69
Korea (yen) ...	9·8	9·8	9·79	9·47	9·33	9·12	8·69

## FOREIGN EUROPE.

### THE COAL RESOURCES OF EUROPE.

The distribution of ownership of the coal resources of Europe has been materially changed by the war. Having regard only to the actual and probable reserves of coal and lignite in seams of one-foot thick and upwards, within a depth of 4,000 feet, in accordance with the estimates obtained by the Executive Committee of the International Geological Congress held in Canada in 1913,\* the position before and after the war may be roughly summarized as follows :—

	Percentage of Total Coal Reserves of Europe.			
	Pre-War.	Post-War.		
Germany	...	...	...	40·2      28·7
United Kingdom	...	...	...	32·0      32·0
Russia	...	...	...	11·6      0·4
Austria-Hungary	...	...	...	8·3      0·2
Belgium	...	...	...	2·1      2·1
France	...	...	...	1·7      3·6
Norway (including Spitzbergen)	...	...	...	1·7      1·7
Spain	...	...	...	1·1      1·1
Other Countries	...	...	...	1·3      1·4
Czechoslovakia	...	...	...	4·7
Poland	...	...	...	13·3
Ukraine	...	...	...	10·8
TOTAL				100·0      100·0

From this table it will be seen that Germany, by losing the Saar coalfield (which includes the coal deposit of Lorraine annexée) has dropped from the first to the second place ; the coal reserves of the new Republics of Poland, Ukraine and Czechoslovakia have become of considerable importance, at the expense of those of Austria-Hungary and Russia ; and the resources of France have been more than doubled.

The following tables, which have been compiled from the information obtained from the International Geological Congress, show in detail the principal changes which have taken place in the distribution of the European coal reserves.

*Pre-War Coal Resources of Austria.*  
(in millions of tons.)

District.	Description.	Quantity.	Transferred to
Alpine region—			
Coal area of the northern Lime-stone Alps	Coal	4	
Mürz and Mur areas ... ...	Lignite	32	
Tyrol ... ... ...	"	2	
Lavantal ... ... ...	"	6	
Miocene at the northern foot of the Karawanken	"	8	
Drau-Save territory ... ...	Coal	*	Jugoslavia.
" ... ...	Lignite	384	"
Carniola, south of the Save ...	"	23	
Istria ... ... ...	Coal	2	Italy.
Dalmatia ... ... ...	Lignite	14	
Cariuthia ... ... ...	Shaly coal and Lignite.	5	Jugoslavia.
" ... ... ...	Lignite	1	
Tertiary plains at the foot of the Alps—			
Wies Eibiswald ... ...	Lignite	18	
Voitsberg-Köflach ... ...	"	89	
Wiener Neustadt .. ...	"	58	
Hausrück ... ... ...	"	80	
North-east of Graz (Weiz area)	"	1	
Ilz-Fehring area ... ...	"	3	
Sudetic region—			
Teplitz-Brüx-Komotau ...	Lignite	10,312	Czechoslovakia.
Falkenau ... ...	"	1,109	"
Eger ... ... ...	"	482	"
Grottau, Sörgsdorf ...	"	3	"
Göding ... ... ...	"	213	Poland.
Galicia ... ... ...	"	12	Czechoslovakia.
Pilsen ... ... ...	Coal	46	"
Kladno-Rakonitz...	"	237	
Rossitz ... ... ...	"	51	
Schatzlar-Schwadowitz ...	"	79	Czechoslovakia.
Ostrau-Karwin-Krakau ...	"	11,685	
Budweis brown-coal " ...	Lignite	16,379	Poland.
Permian coal and anthracite ...	Coal	* 39	Czechoslovakia.
<b>TOTAL ... ...</b>	<b>—</b>	<b>41,377</b>	<b>"</b>
—	Coal.	Lignite.	Total.
Summary—			(In millions of tons).
Transferred to Czechoslovakia ...	12,047	12,158	24,205
" " Italy ... ...	—	4	4
" " Jugoslavia ...	—	421	421
" " Poland .. ...	16,379	12	16,391
Retained by Austria ... ...	55	301	356
<b>TOTAL ... ...</b>	<b>28,481</b>	<b>12,896</b>	<b>41,377</b>

\* Under half a million tons.

*Pre-War Coal Resources of Hungary*  
(in millions of tons)

District.	Description.	Quantity.	Transferred to
<i>Carboniferous :—</i>			
Eibenthal-Ujbyanya ... ...	Coal	2	Rumania.
Biger-Schnellersruhe ... ...	"	*	"
Szekul (Kemenczeszék) ... ...	"	1	"
Lupak ... ...	"	*	"
Toronya ... ...	"	*	"
Csaca-Jabolnka ... ...	"	*	Jugoslavia.
Cabar-Delnice ... ...	"	*	"
<i>Permian :—</i>			
Klokotics-Goruja ... ...	Coal	*	Rumania.
<i>Jurassic :—</i>			
Environs of Berzaszka :—			
Kozla-Szirinia ... ...	Lignite	1	Rumania.
Biger ... ...	"	*	"
Pregeda ... ...	Coal	2	"
Szvinyesza ... ...	"	*	"
Other deposits ... ...	Lignite	2	"
Resica-Doman ... ...	Coal	2	"
Stajerlak-Anina ... ...	Lignite	10	"
Environs of Pecs :—			
Pecs Vasas ... ...	Coal	107	
Komlo ... ...	Lignite	8	
Magyaregregy ... ...	"	*	
Karasz ... ...	"	*	
Szaszvar ... ...	"	1	
Nagymanyok ... ...	"	1	
Tolnavaralja ... ...	"	1	
Environs of Brasso :—			
Feketehalom ... ...	Lignite	*	Rumania.
Keresztenyfalva ... ...	"	*	"
<i>Cretaceous :—</i>			
Ruszkabanya ... ...	Lignite	1	Rumania.
Sebeschely ... ...	"	*	"
Nagybarod ... ...	"	1	"
Ajka-Csingervolgy ... ...	"	1	"
<i>Eocene :—</i>			
Tatabanya-Felsogalla ... ...	Lignite	200	
Environs of Esztergom :—			
Dorog-Tokod ... ...	Lignite	3	
Annavolgy ... ...	"	10	
Other deposits ... ...	"	10	
Bude Mountains ... ...	"	6	
Kosd Coalfield ... ...	"	1	
<i>Oligocene :—</i>			
Kassa-Samodi ... ...	Lignite	*	
Vertessomlyo (Zsemlye) ...	"	*	
Bakony, Szapar-Csernye ...	"	2	
Zsil valley :—			
Petroszeny-Petrilla ... ...	Lignite	180	Rumania.
Petrilla-Farkasvolgy ... ...	"	177	"
Lupeny ... ...	"	124	"
Vulkan ... ...	"	14	"
Almasvolgy :—			
Egeres ... ...	Lignite	10	Rumania.
Farkasmezo ... ...	"	5	"
Kiskeresztes ... ...	"	6	"
Carried forward ... ...		889	

District.	Description.	Quantity.	Transferred to.
Brought forward		889	
Oligocene—cont.			
Croatia :			
Verdnik ...	Lignite	15	Jugoslavia.
Ratkovic ...	"	1	"
Mont-Glina ...	"	3	"
Ivancsica-Kalmik ...	"	9	"
Miocene ( <i>Burdigalien</i> ) :—			
Breunberg-Reczeny ...	Lignite	28	Austria.
Salgotarjan basin :			
Salgotarjan ...	Lignite	58	
Baglyasalja ...	"	16	
Salgobanya ...	"	2	
Andrasfalva ...	"		
Miocene ( <i>Vindobonien</i> ) :—			
Dios-gyor-Ormospuszta ...	Lignite	76	
Sajo valley :			
Disznoshorvat ...	Lignite	26	
Sajoszentpeter ...	"	5	
Sajokaza ...	"	22	
Kirald ...	"	22	
Sajovarkany-Somsaly ...	"	9	
Other deposits ...	"	21	
Environs of Nyitrabanya :			
Handlova ...	Lignite	42	Czechoslovakia.
Privigye-Czegely ...	"	217	"
Uj-Janos-gyarmat ...	"	27	"
Other deposits of Northern Hungary.	"	2	"
Fejerkoros valley...	Lignite	78	Rumania.
Almasvolgye-Bozovics ...	"	15	"
Other deposits ...	"	3	"
Etage Poutien :—			
Lajtaujfalu ...	Lignite	4	Austria.
Varpalota ...	"	1	
Other deposits of Zala ...	"	1	Jugoslavia.
Croatia :			
Ivanec ...	Lignite	4	Jugoslavia.
Kaproncza ...	"	*	"
Kaproncza-Rasinja ...	"	*	"
Pitomaca (Kresnjevica)	"	3	"
Glogovac ...	"	2	"
Other deposits ...	"	11	"
Bodonos-Felsoderne ...	"	10	Rumania.
Etage Levantin ( <i>Astien Sicilien</i> ) :—			
Slavonia ...	Lignite	52	Jugoslavia.
Sicule district :			
Kopecz ...	Lignite	33	Rumania.
Other deposits ...	"	10	"
Gyergyo-Borszek ...	"	*	"
Balmazujvaros-Hortobagy ...	"	1	
TOTAL ...		1,718	

\* Under half a million tons.

Summary—		Million Tons.
Transferred to Austria	...	32
"    Czechoslovakia	...	288
"    Jugoslavia	...	101
"    Rumania	...	687
Retained by Hungary	...	610
<b>TOTAL</b>	...	<b>1,718</b>

Millions of tons.

	Carboni- ferous.	Jurassic.	Cre- taceous.	Tertiary.	Neo- Tertiary.	Total.
	Coal.	Coal.	Coal.	Brown- coal.	Lignite.	
<i>Transferred to</i>						
Austria ...	—	—	—	28	4	.32
Czechoslovakia ...	—	—	—	288	—	288
Jugoslavia ...	—	—	—	28	73	101
Rumania ...	7	13	2	611	54	687
<i>Retained by</i>						
Hungary ...	107	11	1	490	1	610
<b>TOTAL</b>	<b>114</b>	<b>24</b>	<b>3</b>	<b>1,445</b>	<b>132</b>	<b>1,718</b>

#### THE UPPER SILESIAN COAL BASIN.

Before the war, the Upper Silesian coal basin was situated partly in Germany, partly in Austria, and partly in Russia. The total actual and probable reserve of coal in seams of 1 foot and upwards in thickness, within a depth of 4,000 feet, was estimated to be as follows :—

		Million Tons.
Germany	...	74,825
Austria	...	28,064
Russia	...	2,525
<b>TOTAL</b>	<b>...</b>	<b>105,414</b>

By the re-distribution of territory, Poland has acquired from Germany about two-thirds of her share in this basin, or about 49,883 million tons (the calculation is based on superficial area). Also Poland has acquired from Austria about 3,859 million tons, and from Russia 2,525 million tons. The remainder of Austria's share in the basin has been transferred to Czechoslovakia.

The ownership of the coal reserves in the Upper Silesian basin is now roughly as follows :—

		Million Tons.
Germany	...	24,942
Poland	...	56,267
Czechoslovakia	...	24,205
<b>TOTAL</b>	<b>...</b>	<b>105,414</b>

*Distribution of the Coal Reserves of Europe principally affected by the War.*

The reserves given are estimates of the actual and probable quantities of coal (including brown coal and lignite) contained in seams of 1 foot and upwards in thickness, within a depth of 4,000 feet. The calculations are based upon the estimates given in Coal Resources of the World, 1913.

Country.	Reserve in 1913.	Proportion of total European Reserve in 1913.	Additions to Reserve,		Deductions from Reserve.		Fixed Reserve.	Proportion of total European Reserve.	Remarks.
			Transferred from Country.	Quantity.	Transferred to Country.	Quantity.			
Austria ...	... 41,377	Per cent. 8·0	Hungary ...	Millions of tons. 32	Czechoslovakia Jugoslavia ...	Millions of tons. 24,205 421	—	Millions of tons. 388	Per cent. 0·1
Bosnia and Herzegovina ...	3,676	0·7	Germany ...	9,769 (a)	Italy ... Poland ... Jugoslavia ...	4 16,391 3,676	18,577	3·6	(a) The Saar Basin, including Lorraine Annexée.
France ...	8,808	1·7			France ...	9,769 (a)	148,248	28·7	(a) The Saar Basin, including Lorraine Annexée.
Germany ...	207,930	40·2			Poland ...	49,913 (b)	—	—	(b) Including about 30 million tons of lignite in Posen.
Hungary ...	1,718	0·3			Austria ... Czechoslovakia Jugoslavia ... Romania ...	32 288 101 687	610	0·1	
Italy ...	243	*	Austria ... Hungary ...	4	Poland ... Ukraine ... Jugoslavia ...	2,525 55,657 252	—	* 0·1 0·4	
Romania ...	39	*		687					
Russia ...	60,170	11·6							
Serbia ...	252	*							

\* Under half-a-million tons.

Country.	Reserve in 1913.	Proportion of total European Reserve in 1913.	Additions to Reserve.		Deductions from Reserve.		Fixed Reserve.	Proportion of total European Reserve.	Remarks.
			Millions of tons.	Per cent.	Transferred from Country.	Quantity.			
Czechoslovakia	...	—	—	—	Hungary ... Austria ... Hungary ... Austria ... Bosnia and Herzegovina. Serbia ... Austria ... Germany ... Russia ... Russia ...	288 24,205 101 421 3,676 252 16,391 49,913 2,525 55,657	—	—	—
Jugoslavia	...	—	—	—	—	—	4,450	0·9	—
Poland	...	...	—	—	—	—	—	—	—
Ukraine	...	...	—	—	—	—	68,829	13·3	—
European Countries whose coal reserves have remained materially unchanged by the effects of the War.									
Belgium	...	...	11,060	2·1	—	—	11,000	2·1	—
Bulgaria	...	...	388	0·1	—	—	388	0·1	—
Denmark (c)	...	...	50	*	—	—	50	*	(c) Including Faroe Islands and Greenland.
Greece	...	...	40	*	—	—	40	*	—
Montenegro	...	...	very small	*	—	—	—	—	—
Netherlands	...	...	1,712	0·3	—	—	1,712	0·3	—
Norway (d)	...	...	8,750	1·7	—	—	8,750	1·7	—
Portugal	...	...	20	*	—	—	20	*	—
Spain	...	...	5,537	1·1	—	—	5,537	1·1	—
Sweden	...	...	115	*	—	—	115	*	—
Switzerland	...	...	very small	*	—	—	“165,387	32·0	—
Turkey	...	...	165,387	32·0	—	—	—	—	—
United Kingdom...	...	...	—	—	—	—	—	—	—
Total	...	517,212	99·8	—	—	—	163,921	163,921	517,212
									100·0

\* Under half-a-million tons.

NOTE.—No deduction has been made for the quantity of coal mined since 1913.

(c) Including Faroe Islands  
and Greenland.

(d) Including Spitzbergen.

### **Albania.**

(Now Mandatory to Italy.)

Very little is known concerning the mineral wealth of Albania, as the hostility of the natives towards mining engineers has rendered extensive prospecting impossible.

French and German investigators have discovered deposits of coal and lignite, but their value is not yet known.

### **Austria-Hungary.\***

Before the war the Austrian Empire was joined to the Kingdom of Hungary by the identity of sovereigns. The Empire of Austria included Upper and Lower Austria; Bohemia (now part of Czechoslovakia); Bukovina (now part of Rumania); Carinthia; Carniola (now partly in Jugoslavia); Dalmatia and Istria (now forming part of the "buffer" State, Fiume-Istria-Dalmatia); Galicia (now forming part of Poland); Moravia (now forming part of Czechoslovakia); Salzburg; Silesia (partly transferred to Czechoslovakia, and partly to Poland); Styria (partly transferred to Jugoslavia); Trieste (now forming part of Italy); Tyrol (a part, the Trentino, now transferred to Italy); Vorarlberg; together with Bosnia and Herzegovina, as administered territories (now forming part of Jugoslavia).

By the terms of the Peace Treaty of 4th June, 1920, Hungary surrendered to Austria a strip of territory described as Bürgenland (or West Hungary). Hungary, besides surrendering Bürgenland to Austria, gave up "Slovakia" to Czechoslovakia, Transylvania to Rumania, and Croatia and Slavonia to Jugoslavia. The region of "Slovakia" constituted the northern part of Hungary, and comprised 17 counties, with an area of 22,000 square miles, approximately.

† In 1913 the principal Austrian coalfields were those of Pilsen, Kladno-Rakonitz, Schatzlar-Schwadowitz, Ostrau-Karwin, and Jaworzno, and the separate coalfield of Rossitz, in Moravia.

Brown coal or lignite is mined very extensively. The most important field is situated on the southern slopes of the Erzgebirge, the centre of activity being at Dux-Ossegg. The bed is flat, and from 40 feet to 53 feet in thickness. Lignite is mined also in Styria.

The Tertiary brown-coal deposits of Bohemia, which is now part of Czechoslovakia, represent more than 90 per cent. of the

\* Statistik des Bergbaues in Österreich für das Jahr 1915, Part I. Ungarisches Statistisches Jahrbuch, 1915.

† "The Times" Fuel Number, London, 1914, pp. 18, 19.

total lignite and brown-coal reserves of Austria (pre-war territory). \*The majority of the Austrian brown-coals require the addition of a binding material in order to render them capable of being briquetted, and this would prove too costly. In 1913, out of a total production of brown coal amounting to nearly 27 million tons, less than half-a-million tons were briquetted, producing about one-quarter of a million tons of briquettes. Briquetting on the German system, without the addition of a binding material, has been carried on for a long time at Königsberg, on the Eger, with a very moist brown coal of an earthy nature similar to that of Central Germany.

The following table gives analyses of Königsberg brown coal and brown-coal briquettes :—

—	Mois-	Ash.	Fixed	Volatile	Calorific
	ture.		carbon.	hydro-	value.
	Per cent.	Per cent.	Per cent.	Per cent.	Cals.
Königsberg brown coal, as mined	44·5	3·2		52·3	
" " briquettes	18 to 36	2 to 8	32 to 35	35 to 40	4,000 to 5,600

Before the war, Hungary was the third largest producer of Tertiary brown-coal, but about 66 per cent. of her reserves of this mineral are now transferred, chiefly to Rumania and Czechoslovakia. The brown coal of Hungary contains little "water of hydration," compared with that of Germany, and it requires, apparently, the addition of a binding material for the manufacture of briquettes.

By the provisions of the Peace Treaty, Austria's most important resources of coal and lignite were transferred to Poland and Czechoslovakia.

Bohemia was by far the largest producer of brown coal in Austria (as constituted before the war), and had in 1912 an output of 21,453,219 tons. The principal workings are in the Brüx-Dux-Teplitz and Falkenau-Elbogen basins. In the former basin there are seams reaching a thickness of 98 feet.

Styria came next in importance, after Bohemia, and produced over 3,000,000 tons of brown coal in 1912, chiefly from the coal-basin comprising the Voitsberg-Köflach, Tüffer-Hrastnigg-Trifail,

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\* A Handbook of Briquetting, by G. Franke, translated by F. C. A. H. Lantsberry, 1916, Vol. I, p. 583.

Fohnsdorf, Leoben, Wies-Eibiswald, and the Schalltal districts. The seams are fairly thick—in the Schalltal there is a seam which, in places, exceeds 325 feet in thickness.

Important deposits of brown coal occur in Upper Austria, in the Wolfsegg-Traunatal district; in Carniola, near Sagor and Gottschee; and in Dalmatia, at Silverić and Velusić.

The principal brown-coal mines in Hungary are situated in the counties of Nógrád, Borsod and Hunyad, though there is a considerable output from the counties of Esztergom, Komárom and Sopron.

Of the coal production of Austria, in 1912, 6,940,039 tons were obtained from the Upper Silesian coal-basin, which comprises the Ostrau-Karwin district in Moravia and Upper Silesia, and the Jaworzno district in Galicia. This coalfield is a continuation of the Upper Silesian coalfield of Germany and the Dombrova coalfield of Russia (Poland). The Upper Silesian coalfield ranked first in importance among the coalfields of Austria. The Moravian and Upper Silesian section contains 313 seams, ranging from 18 inches to 12 feet in thickness, of which 102 are workable, and produce excellent coking coal. The Galician section contains 13 seams, aggregating 105 feet of coal.

The other important producing area is that of Central Bohemia, which contains the Kladno-Schlan-Rakonitz coalfield, where a main seam of coal from 19 feet 6 inches to 39 feet in thickness is worked; and the Pilsen coal-basin, in which cannel coal occurs. A part of the Lower Silesian coal area, near Schatzlar and Schwadowitz, extends to North-Eastern Bohemia.

In Central Moravia and in the Alpine region, seams of coal are worked; those in the latter area, however, are not very thick.

The principal coal regions of Hungary are in the counties of Baranya and Krassó-Szörény.

\*The approximate coal reserves of Austria-Hungary were estimated as follows:—

	<i>Austria.</i>	Tons.
Actual reserve (coal) ...	...	2,969,700,000
,, (brown coal) ...	...	12,230,800,000
Probable reserve ...	...	38,675,700,000
	<hr/>	<hr/>
TOTAL ...	...	53,876,200,000

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\* Coal Resources of the World, 1913, Vol. I, p. xciii.

*Hungary.*

Actual reserve	...	...	357,953,418 tons in 126 sq. miles
Probable reserve	...	1,358,749,000	,, 440 ,,
<b>TOTAL</b>	...	<b>1,716,702,418</b>	,, <b>566</b> ,,

The "possible" reserve is not large.

*Analyses of Austrian Coals and Lignites.\**

Seam.	Proximate Analysis.			Ultimate Analysis.			Calorific Value.
	Moisture.	Fixed Carbon.	Ash.	Carbon.	Hydrogen.	Oxygen and Nitrogen.	
Ostrau series— Rotschild      Moravian	Per cent. 1·6	Per cent. 84·8	Per cent. 6·2	Per cent. 89·0	Per cent. 4·1	Per cent. 6·7	Cals. 7,622
Ostrau Franziska      "	0·2	77·8	5·4	89·0	5·0	7·0	8,128
Adolf      "	2·6	62·7	3·6	84·1	5·2	10·7	7,409
Eugen, Peterswald ...	3·3	61·8	10·4	82·8	5·4	10·6	6,801
Tenczynek ... ...	19·0	53·0	4·0	76·4	5·6	18·0	5,400
Schatzlar series— Kasimir, Karwin ...	3·6	70·4	12·6	86·6	4·1	8·0	6,908
Ludwig      "	1·4	66·1	8·5	84·6	5·1	9·2	7,210
Jaworzno area	19·0	57·0	9·5	75·0	4·7	20·0	5,000

\* Coal Resources of the World, 1913, Vol. III, p. 1068.

## *Analyses of Austrian Coals and Lignites.*

Locality.	Proximate Analysis.			Ultimate Analysis.						Coke.	Calorific Value.
	Moisture.	Fixed Carbon	Ash.	Moisture.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.		
13 Ostran	West Galicia.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Cals. 6,930.
14 Karwin	...	...	...	2·15	75·11	4·19	10·17	1·14	7·24	6·71	6,885
				3·23	74·19	4·34	10·64	0·89			
15 König Colliery	Upper Silesia.	...	...	5·56	73·36	4·32	10·22	1·10	5·44		6,804
16 Myslowitz Colliery	...	...	...	10·01	66·45	3·75	12·57	1·35	5·97		5,977
17 Tonezynek—Adam Seam...		...	...	14·22	63·17	4·11	13·66	1·09	3·73		5,739
18 Haberspirk-Haselbach	Bohemia.	...	...	37·12	43·16	3·12	11·88	0·45	2·79	4·27	3,816
19 Elbogen-Nensatid Basin	Basin	...	...	9·12	59·41	6·46	14·94	0·39	2·71		6,156
20 München Basin	...	...	...	29·73	46·90	3·75	12·95	0·68	2·25		4,289
21 Unterreichenau Basin	...	...	...	16·58	58·57	5·27	12·79	0·53	1·53		5,747
22 Haselbach Basin	...	...	...	17·61	56·57	5·47	13·46	0·45	2·56		5,599
23 Unterreichenau Basin	...	...	...	39·98	42·04	2·76	11·61	0·59	0·61		3,561
24 Unterbank	...	...	...	34·05	43·45	3·88	10·34	0·53	0·81		4,170
25 Haselbach Basin	...	...	...	40·96	40·48	3·23	9·96	1·03	0·32		3,728
26 Zwodau Basin	...	...	...	31·18	48·43	3·39	12·14	0·77	0·47		4,370
27 Pochlowitz Basin (sample from)	...	...	...	45·58	36·77	3·32	12·38	0·32			3,190
28 Nikolaus Mine (sample from)	...	36·80	44·21	38·18	3·55	9·65	0·68		3·73		3,586
29 Wondrebmulde (sample from)	...	44·84	38·26	3·00	8·90		1·00		4·0		3,867
30 Pochlowitz (sample from)	...	31·95	41·82	38·50	3·58	10·64	1·34		4·12		3,554
31 Eger Basin. Königsberg Coal Co. (briquettes)	...	14·35	57·71	5·06	17·25		0·52		5·11		5,442
32 Eger Basin. Königsberg Coal Co. (briquettes)	...	16·20	56·92	5·54	15·42	0·00			5·92		5,560

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 51. Zeit. f. Dampfkessel u. Maschinenbericht, 1907, pp. 2-5.  
 52. J. Käweic. Österreich. Zeit. f. Berg- u. Hütt., Vol. LIII, pp. 535-538, Journ. Iron and Steel Inst. (London), 1905, **2**, 574.  
 53. *Ibid.*, pp. 213-216.

*Production of Coal in Austria.*

Year.	Coal.			Brown Coal.			Total.		
	Quantity (long tons).			Quantity (long tons).			Total Value (£).*	Quantity (long tons).	Value (£).*
	State Mines.	Private Mines.	Total.	State Mines.	Private Mines.	Total.			
1913	...	168,216	16,027,139	16,195,355	7,174,622	1,661,334	25,276,989	26,938,323	6,222,820
1914	...	180,093	15,116,508	15,296,601	7,227,983	1,533,513	21,668,249	23,201,621	5,627,234
1915	...	211,348	15,816,645	16,027,993	8,190,399	1,475,338	20,233,899	21,709,237	5,924,005
1916	...	...	...	17,318,823	16,460,300	93,053	21,278,389	22,877,039	40,145,862
1917	...	...	...	16,460,300	89,018	...	2,032,581	21,278,389	37,738,689
1918	...	...	...	93,053	89,018	1,974,521	1,974,521	2,125,634	2,063,539
1919†	...	...	...	...	...	...	...	...	...

\* Values converted to £ sterling at the rate of Kr 24.02 = £1, as no trustworthy average rate of exchange is available.

† Figures for 1918 and 1919 represent production in the newly-created Austrian Republic.

*Production of Coal in the newly-created Austrian Republic.*

Year.	Quantity (long tons).		
	Coal.	Brown Coal.	Total.
1913 ... ... ...	86,110	2,616,839	2,702,949
1914 ... ... ...	83,499	2,359,212	2,442,711
1915 ... ... ...	75,196	2,445,679	2,520,875
1916 ... ... ...	85,214	2,465,496	2,550,710
1917 ... ... ...	87,422	2,176,675	2,264,097
1918 ... ... ...	93,053	2,032,581	2,125,634
1919 ... ... ...	89,018	1,974,521	2,063,539

*Imports and Exports of Coal into and from Austria.*

Year.	Quantity (long tons).					
	Imports.			Exports.		
	Coal.	Brown Coal.	Total.	Coal.	Brown Coal.	Total.
1913 ... 13,469,150	32,575	13,501,725	697,602	6,903,839	5,490,343	7,601,441
1914 ... 9,875,582	32,672	9,908,254	458,647	5,086,333	5,948,990	6,191,562
1915 ... 9,319,386	37,940	9,357,326	1,105,229	479,046	5,196,390	5,675,436
1916 ... 11,831,775	36,197	11,867,972	—	—	—	4,065,947
1917 ... 10,281,690	26,304	10,307,994	178,765	3,887,182	—	—
1918 ...						
1919* ... 1,602,125	1,210,289	2,812,414	—	—	—	—

\* Figures for 1919 relate to the newly-created Austrian Republic.

*Analyses of Hungarian Coals and Lignites.*

No.	Basin.	Locality.	— Age.	Ultimate Analyses.								Calorific Value.
				Mois-ture.	Carbon.	Hydro-gen.	Oxygen.	Nitro-gen.	Sulphur.	Ash.	Bitum-inous matter.	
1	Eibenthal-Ujbanya	Vaskapu Mt.	Carboniferous	Percent. 67-77	Percent. 3-4	Percent. 2-3	Percent. 1·12	Percent. 0·68	Percent. 4·94	Percent. 16·2·	Percent. 15-22	Cals. 6,311-7,304
2	Biger	Schnellersruhe Mine	"	0·82	72·36	3·87	7·05	1·33	1·32	17·64	0·5	7,061
3	Kemeneczesek coal-field	Szekul Mine	"	1·38	67·21	4·33						6,463
4	Klokotes	...	Permian	0·25	73·49	4·59						7,074
5	Kozla-Szirina-Kamenica	Kozla Mines at Drenkova	Lias	58·94-	4·01-	3·60-	0·42-	4·25-	23·53-	20·70	Percent. 0·5	5,831-6,253
6	Biger coal	...		63·21	4·27	6·98	1·02	5·36				5,800-
7	Pregeda	...	"	82·00	2·60		0·64					6,000
8	Resica-Doman	...		75·56-	4·14-	4·02	1·15-		0·39-			7,386
9	Anina-Stajerlak	...	(Average of 12 samples)	80·33-	4·30		1·17		0·57			7,583
10	Komlo	...	"	65·09-	4·12-	6·32-	0·64-	0·28-	8·02			4,448-
11	Meesek Mt.	...		77·27	4·53	10·30	0·95	1·25	19·76			7,344
12	Bihar und Bezegyseg	Nagymanyok	Cretaceous	3·01-	62·86-	4·19-	9·70-	7·05	2·17-	18·07-	Percent. 0·5	5,992-7,147
				1·93	75·25	4·42			1·52	9·83		5,545-
				"	59·35-	3·62-	6·88-	0·75-	0·24-	23·46-		6,810
					71·02	5·04	10·69	1·15	1·72	9·47		5,612
					59·78	4·40	13·09	1·15	1·18	12·67	1·83	

13	Ajka	...	...	Cretaceous	13·63- 21·52	48·02- 53·95	3·20- 10·76	10·11- 1·24	0·58- 12·0-15·0	0·57
14	Tatabanya	...	...	Tertiary (Eocene)	10·14	56·00-	4·3- 60·00	12·0-15·0	2-3	5,093- 5,600- 5,900
15	Esztergom	...	...	"	8·12	55·00- 58·00	3·5- 4·0	11·0-13·0	3-5	4,706- 5,097
16-	Anna Völgy Valley	...	...	Esztergom Leonine and Pauline Mines	"	13·96- 14·98	54·32- 58·82	3·93- 4·42	12·08- 15·23	5·22- 6·44
17	Ocsnok Mine	...	...	"	10·47-			0·93	0·93	10·66- 10·99- 12·40
18	Buda Mountains	...	Pilisvorosvar	"	13·43	53·50-	4·36-	8·66	0·70-	5·76- 6·763
19	Somodi	...		Tertiary (Oligocene)	3·17- 4·23	56·47	5·29	10·46-	0·97	19·87- 3·866-
20	Farkasvölgy	...		"	11·34-	40·45-	3·35-	11·39-	1·5-	18·45- 4·386
21	Almas Valley	...	Egeres (average of 9 samples)	12·64	45·95	3·79	13·76	1·19	5·32	28·37
22	-		Verdnik (average of 12 samples)	"	1·95- 7·55	53·78- 72·30	3·79- 5·64	8·48- 13·63	0·73- 1·33	1·03- 3·28
23	-		Tolis Collieries	"	11·69	51·40	3·88	10·95	0·97	1·19- 24·16
24	-		Zsyltat Collieries	"	4·18	68·89	4·97	13·09	1·06	0·96
25	Lupeny	...	Hunyad	"					2·08	7,107- 10·49
26	Jelna Basin	...	Herculesbad	"					5·73	4,970
				"					54·81	4·28
				"						7,000
				"						14·75
				"						26·16

## References

1-22-Cat Resources of the World 1913 Vol III

[See also Descriptions of the World, 1910, Vol. III, p. 331.]

3.—W. A. Churchill, Board of Trade Report, (London), Vol. LXVII, p. 331. Journ. Iron & Steel Inst. (London), 1910, No. 1, 567.

4.—J. Andrews, *Österr. Zeit für Berg- u. Hüttenk.*, Vol. 17, pp. 481-498, 501-523, 531-535. Journ. Iron & Steel

*Production of Coal in Hungary.*

Year.	Coal.			Brown Coal.			Total. Quantity (long tons). Value* (£).	Total Quantity (long tons). Value* (£).	Total. Quantity (long tons). Value* (£).		
	Quantity (long tons).		State Mines.	Quantity (long tons).		State Mines.					
	State Mines.	Private Mines.		Total.	Total.	Total.					
1913	...	...	47,649	1,251,057	1,298,706	765,000	603,133	8,207,094	8,810,227		
1914	...	...	49,081	1,048,823	1,097,904	670,000	564,748	7,364,564	7,929,312		
1915	...	...	72,125	1,007,496	1,079,621	731,000	568,458	7,463,958	8,032,416		
1916	...	...	...	...	...	...	...	...	3,838,000		
1917	...	...	...	...	1,197,834	...	...	7,487,681	...		
1918	...	...	...	...	...	...	...	...	8,685,515		
1919	...	...	...	...	...	...	...	...	3,842,958		

\* Values converted to £ sterling at the rate of Kr. 24.02 = £1, as no trustworthy average rate of exchange is available.

*Production of Coke in Austria.*

Year.	Coke produced from :—				Total.	
	Bituminous Coal.		Brown Coal.			
	Quantity of Coal used (long tons).	Quantity of Coke produced (long tons).	Value of Coke* (£).	Value of Coke* (£).		
1913	... 3,490,812	2,520,607	1,989,959	90,990	3,581,802	
1914	... 2,753,121	2,164,748	1,670,568	4,374	2,757,495	
1915	... 2,423,828	1,910,529	1,482,570	4,934	2,428,762	
1916	... ...			2,538		
1917	... ...			1,074		
1918	... ...			935		
1919	... ...			11,140	2,557,016	
				1,074	2,001,099	
					1,671,503	
					1,483,644	
					2,543,135†	
					2,576,402†	
					2,037,590†	
					1,551,021‡	

*Production of Briquettes in Austria.*

Year.	Briquettes produced from :—				Total.	
	Bituminous Coal.		Brown Coal.			
	Quantity of Coal used (long tons).	Quantity of Briquettes produced (long tons).	Value of Briquettes* (£).	Value of Briquettes* (£).		
1913	... 179,036	192,989	124,680	424,952	109,928	
1914	... 170,497	190,387	121,823	382,708	100,435	
1915	... 187,704	201,792	129,992	422,730	113,872	
1916	... ...					
1917	... ...					
1918	... ...					
1919	... ...					
					603,988	
					553,205	
					610,434	
					438,735	
					415,761	
					450,860	
					234,608	
					222,258	
					243,864	

\* Values converted to £ sterling at the rate of Kr. 24·02 = £1, as no trustworthy rate of exchange is available.

† Provisional figures, subject to revision.

*Production of Coke and Briquettes in Hungary.*

Year.	Coke.		Briquettes.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ... ...	157,500	186,053	115,303	94,047
1914 ... ... ...	126,059	148,626	110,239	93,672
1915 ... ... ...	93,590	110,075	129,427	122,856
1916 ... ... ...				
1917 ... ... ...				
1918 ... ... ...				
1919 ... ... ...				

\* Values converted to £ sterling at the rate of Kr. 24·02 = £1, as no trustworthy rate of exchange is available.

**Belgium.\***

In 1919, by the Versailles Peace Treaty, Germany ceded Moresnet and part of Malmedy to Belgium, and on September 20th, 1920, after a plebiscite, Belgium acquired the district of Eupen and the remainder of Malmedy. By the Anglo-Belgian Agreement of July, 1919, the districts of Ruanda and Urundi, portions of the former territory of German East Africa, which adjoin the Belgian Congo on the east, were assigned by Great Britain to Belgium.

There are three coalfields in Belgium, namely, (1) the Dinant field, in the south; (2) the Namur field, situated in the central part of the Haine-Sambre-Meuse trough, and (3) the Campine field, in the north.

At present, the Namur field only is being worked; the Campine field has been proved by boring, and it is expected that mining will soon begin.

The coal seams are numerous, but usually thin, ranging from 1 foot 9 inches to 2 feet 6 inches in thickness; the average thickness of the seams worked in the Namur field, in 1910, was only 2 feet  $1\frac{1}{2}$  inches. There are three classes of coal—bituminous, cannel, and semi-cannel, but the first only is of any great industrial importance. The bituminous coals differ widely in character, the volatile matter ranging from 16 per cent. in short-flaming varieties to 37 or 40 per cent. in long-flaming coals.

The reserve of coal in the Dinant field is considered to be unimportant; in the Namur field it is estimated to be about 3,000,000,000 tons, and in the Campine field 8,000,000,000 tons. The estimate, in the case of the Campine field, takes into account

\* Annales des Mines de Belgique. Le Commerce de la Belgique, 1913 and 1919.

all seams of not less than 1 foot 3 inches in thickness, to a depth of 5,000 feet. About one-half of the whole reserve consists of coking coal.

In 1913, Belgium produced 22,474,493 tons of coal, as compared with 22,602,945 tons in 1912. During the previous years there had been a decline in the production, and the figures for 1913 were the lowest since 1905. The Hainault Province continued to be by far the leading coal producing district, and contributed over 16,000,000 tons to the 1913 production.

In 1915, the total output of coal was 13,949,647 tons. During the same period 506,330 tons of coke and 1,466,152 tons of briquettes were produced. Large quantities of Belgian coal were exported after the beginning of the war, and about 700,000 tons were shipped to Holland in 1915. Towards the end of 1916, the Germans began to develop a new coalfield at Limburg, including the construction of by-product ovens, but, with the deportation of miners, this work ceased.

In 1917, practically the whole of the coal mines in Belgium were held by the Germans, and the output amounted to 14,691,372 tons.

In 1918, the output fell to 13,668,145 tons, but, in 1919, it rose to 18,185,834 tons.

The exports of coal, in 1913, were 4,901,420 tons, as compared with 4,976,711 in 1912, and the imports for those years were 8,713,822 tons and 8,001,321 tons, respectively. The imports of coal from both Germany and Great Britain showed substantial increases, while those from France were nearly half-a-million tons less.

Imports of coke, in 1913, were 1,109,965 tons, compared with 1,222,039 in 1912; and exports decreased from 1,298,982 in 1912 to 1,095,788 in 1913.

Excepting for domestic purposes, the most important use for Belgian coal is in the manufacture of coke and briquettes, the metallurgical industry being the principal one in the country.

The provision, in the future, for the large quantities of coke required by the Belgian iron and steel industries depends considerably upon the development of the Campine coalfield. With the return of Lorraine to France, Belgian blast furnaces will be called upon to increase their output, entailing an increase in the coke consumption of, possibly, 30 per cent.

The importation of coal, in 1913, from England, France and Germany amounted to 36 per cent. of the Belgian production, and about 22 per cent. of this quantity was used in the manufacture of coke. These imports came chiefly from the Westphalian and Aachen districts of Germany.\*

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\* H. F. Crooks, *Economic Geology*, Lancaster, Pa., 1920, vol. 15, p. 293.

Characteristics of the South Basin which underlies the provinces of Hainault, Namur and Liége.

Province.	District.	Number of Mines in Operation, 1913	Thickness of Seam.		Average depth of Mining.	Kind of Coal Produced.
			Average.	Maximum.		
Hainault	Mons*	24	ft. ins. 1 9	ft. ins. 5 6	ft.	Gas, coking and steam.
	Centre†	11	2 1		1,460	Coking and steam.
	Charleroi‡	13	2 3		1,790	Gas, steam, and anthracitic.
Namur ...	Namur§ ...	12	2 5			Anthracitic.
Liége ...	Liége   and Herve.	43	1 6	5 10	1,460	Gas, steam and anthracitic.

Location of area : \* "Couchant de Mons" or "Borinage" lies between the French frontier and Mons.

† The "Bassin du Centre" lies between Mons and Charleroi; bounded on the north by the Brussels Canal, and on the south by the Sambre River.

‡ From Charleroi to the eastern boundary of Hainault.

§ This Basin is very narrow and its depth is less than that of either Hainault or Liége.

|| This district extends from the east to west boundaries of the province and continues on the east as the Aachen field of Prussia.

The coal-bearing area of the Campine field occupies the province of Limbourg, and has been followed into the central part of the province of Anvers (Antwerp). It contains the following beds\* :—

Group.	Thickness of Group.	Number of Exploitable Beds of Coal.	Mean Thickness of Coal in Exploitable Beds.	Percentage of Exploitable Coal.	Percentage of Volatile Matter.
I ...	Yards. 550	10	ft. in. 26 5	Per cent. 1·60	Per cent. 35-40
II ...	308	10-14	29 8	3·20	32-47
III ...	264	11-18	38 3	4·80	22-38
IV ...	176	4-5	11 3	2·10	18-30
V ...	220 418	barren 5-7	13 2	1·05	12-26
	1,936	47	118 9	2·00	12-47
Productive beds explored— II, III, and IV ...	748	31	79 2	3·40	18-47

\* Annales des Mines de Belgique, 1914, vol. xix. p. 18.

*Estimated Belgian Coal Reserves.*

(In millions of tons).

Province.	Long Flame Coal.	Short Flame (Coking) Coal.	Other Bituminous Coal and Anthracite.	Within a depth of :-
<i>South Basin.</i>				
Hainault ... ...	500	1,000 100	900 500	Yards. 1,320 1,320
Liége and Namur ...				
<i>Campine Basin.</i>				
Limbourg ... ...	3,600	2,900	500	1,650
Anvers ... ...		1,000		1,650
TOTAL ... ...	4,100	5,000	1,900	

*Analyses of Belgian Coals.\**

District.	Available Reserve.	Character of coal.	Volatile Matter.
Le Borinage ... ... ...	Plentiful ... ...	{ Steam ...	15 to 17
Liége ... ... ...	Scarce ... ...		
Charleroi ... ... ...	," ... ...		
Charleroi ... ... ...	Worked out ...	{ Coking	17 to 24
Liége ... ... ...	Greatly reduced ...		
Le Borinage ... ... ...	Relatively abundant ...		
Liége ... ... ...	Worked out ...	{ Gas ...	24 to 32
Charleroi ... ... ...	Large " quantities ...		
Le Borinage ... ... ...	Small " quantities ...		
Liége ... ... ...	Exhausted ... ...	{ Gas ...	32 to 45
Charleroi ... ... ...	," ... ...		
Centre ... ... ...	," ... ...		
Le Borinage ... ... ...	Small " quantities ...		

\* Moniteur des Intérêts Materiels, Vol. LIII, pp. 3397, 3449, 3529, 3606, 3640, 3795 and 3879. Journ. Iron and Steel Inst. (London), 1904, 1, pp. 505-506.

*Production of Coal in Belgium.*

32

	Quantity (long tons).						Value* (£.).
	1913.	1914.	1915.	1916.	1917.	1918.	
<b>Production of coal containing :—</b>							
\$More than 25 per cent. volatile matter .....	2,076,867	1,633,597	1,689,464	2,186,673	2,217,441	1,863,895	2,429,084
25 per cent. to 16 per cent. volatile matter .....	5,365,973	3,908,253	3,754,681	4,189,656	3,828,564†	3,375,219†	3,946,242
16 " " to 11 " " " .....	9,559,466	7,140,556	5,809,606	6,863,197	5,887,248	5,834,647	8,020,976
**Less than 11 per cent. volatile matter .....	5,472,187	3,763,025	2,695,896	3,352,333	2,758,119	2,594,384	3,789,532
<b>TOTAL</b> ... ... ... .....	<b>22,474,493</b>	<b>16,445,431</b>	<b>13,949,647</b>	<b>16,591,859</b>	<b>14,691,372</b>	<b>13,668,145</b>	<b>18,185,834</b>
<b>Value of coal containing :—</b>							
\$More than 25 per cent. volatile matter .....	1,482,359	1,077,849	1,342,474	1,768,275	2,354,794	3,027,645	5,934,933
25 per cent. to 16 per cent. volatile matter .....	4,034,096	2,690,186	2,836,033	3,357,229	4,056,882†	5,206,906‡	9,498,798
16 " " to 11 " " " .....	7,229,022	5,101,643	4,512,337	5,471,895	6,450,956	9,351,136	19,784,712
**Less than 11 per cent. volatile matter .....	3,864,897	2,416,184	1,902,379	2,428,933	2,802,353	4,056,978	9,240,295
<b>TOTAL</b> ... ... ... .....	<b>16,610,374</b>	<b>11,285,862</b>	<b>10,593,223</b>	<b>13,026,332</b>	<b>15,664,988</b>	<b>21,644,665</b>	<b>44,458,738</b>

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

† Including 114,53 tons produced in Limbourg value £17,962.

‡ Including 64,615 " " " " £126,784.

|| Charbon gras.

||| Charbon maigre.

*Exports of Coal from Belgium.*

To	1913.		1919.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
United Kingdom ... ...	14,086	10,956	15,723	73,699
Egypt ... ...	5,126	3,987	—	—
Union of South Africa ... ...	1,627	1,266	—	—
Canada ... ...	2,460	1,913	—	—
India ... ...	295	229	—	—
Australia ... ...	4,131	3,213	—	—
Total to British Possessions	27,725	21,564	15,723	73,699
Denmark ... ...	5,810	4,519	63,863	249,794
France ... ...	4,173,993	3,246,388	1,611,161	4,362,212
Germany ... ...	249,206	193,823	29,908	97,247
Greece ... ...	—	—	6,642	24,405
Italy ... ...	5,657	4,400	64,445	253,899
Luxemburg ... ...	94,603	73,579	74,476	232,724
Netherlands ... ...	242,111	188,306	1,094,739	3,665,840
Norway ... ...	8,070	6,277	5,633	23,394
Sweden ... ...	3,399	2,644	10,751	42,797
Switzerland ... ...	42,328	32,921	245,016	1,034,412
Russia ... ...	4,378	3,405	—	—
Turkey ... ...	8,899	6,921	—	—
United States ... ...	11,045	8,590	85,607	285,349
Argentina ... ...	4,636	3,606	—	—
Brazil ... ...	2,984	2,321	5,571	21,134
China ... ...	2,312	1,798	—	—
Other Foreign Countries ...	14,264	11,094	43,715	154,374
Total to Foreign Countries	4,873,695	3,790,592	3,341,527	10,447,581
<b>TOTAL ... ...</b>	<b>4,901,420</b>	<b>3,812,156</b>	<b>3,357,250</b>	<b>10,521,280</b>

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Imports of Coal into Belgium.*

From	1913.		1919.	
	Quauality (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
United Kingdom .. ...	2,244,680	1,745,834	119,947	502,311
France ... ...	815,357	634,157	125	425
Germany ... ...	5,126,944	3,987,560	1,718	4,266
Netherlands ... ...	525,836	408,977	1	79
Other Foreign Countries ...	1,005	782	63	280
Total from Foreign Countries...	6,469,142	5,031,476	1,907	5,050
<b>TOTAL ... ...</b>	<b>8,713,822</b>	<b>6,777,310</b>	<b>121,854</b>	<b>507,361</b>

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Analyses of Cokes.*

No.	Districts.	Mois-ture.	Ash.	Carbon.	Hydro-gen.	Oxygen and Nitrogen.	Sul-phur.	Phos-phorus.
		Percent.	Percent.	Percent.	Percent.	Per cent.	Per cent.	Percent.
1	Agrappe (unwashed)	11.40	87.54				0.22	
2	" (washed) ...	5.55	93.87				0.18	
3	Chavalières (washed)	6.96	92.24				0.80	
4	Strépy (unwashed)	11.32	88.01				0.67	
5	Tilleur ...	12.00	87.50				0.50	
6	Liége ...	8.94	12.00	81.05	0.88	1.88	1.22	0.08
7	Hörloz ...	2.75	11.25	83.47	0.32	1.24	0.05	0.02
8	Charleroi ...	4.40	14.82	78.30	0.42	1.59	0.93	0.04
9	Fontaine l'Evêque ...	5.80	15.54	76.00	0.84	1.26	1.02	0.04
10	La Louvière ...	6.10	16.27	75.54	0.40	1.72	0.94	0.03
11	Ghlin-lez-Mons ...	4.87	14.68	78.25	0.32	1.02	0.84	0.02
12	Foundry cokes (ave-age of 15)		6.80					
13	Blast-furnace cokes		16.70					

*References.*

1-5.—O. Simmersbach, Stahl und Eisen, Vol. XXIV, pp. 795-796; Bulletin de l'Association Belge des Chimistes; Journ. Iron and Steel Inst. (London), 1904, 2, pp. 496-497.

6-11.—R. Grünwald, Stahl und Eisen, Vol. XXVI, p. 175. Journ. Iron and Steel Inst. (London), 1906, 1, p. 342.

12-18.—O. Simmersbach, Stahl und Eisen, Vol. XXIV, pp. 795-796. Journ. Iron and Steel Inst. (London). 1904, 2, 497.

*Production of Coke in Belgium.*

Year.	Number of Works.	Number of Ovens.	Quantity of Coal used in the manufacture of Coke (long tons).	Production of Coke.	
				Quantity (long tons).	Value* (£).
1913 ...	41	2,898	4,527,793	3,466,380	3,810,408
1914 ...	36	2,651	2,580,687	1,969,500	1,945,212
1915 ...	14	720	665,559	506,330	530,278
1916 ...	15	667	989,793	779,616	900,065
1917 ...	14	627	843,168	665,175	1,026,846
1918 ...	12	569	647,169	513,817	1,168,460
1919 ...	17	1,077	971,206	744,726	2,779,092

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Exports of Coke from Belgium.*

To	1913.		1919.	
	Quantity. (long tons).	Value* (£).	Quantity. (long tons).	Value* (£).
United Kingdom ... ...	—	—	39	198
Egypt ... ...	8,255	8,517	—	—
India ... ...	2,557	2,638	—	—
Australia ... ...	10,665	11,002	—	—
Total to British Possessions	21,477	22,157	39	198
France ... ... ...	502,873	518,788	54,005	164,887
Germany ... ... ...	277,054	285,822	—	—
Greece ... ... ...	2,280	2,352	—	—
Italy ... ... ...	7,438	7,674	—	—
Luxemburg ... ... ...	142,525	147,036	126,193	389,730
Netherlands ... ... ...	37,407	38,590	80,802	152,557
Norway ... ... ...	7,400	7,634	—	—
Russia ... ... ...	1,798	1,854	—	—
Spain ... ... ...	3,567	3,680	—	—
Sweden ... ... ...	12,860	13,267	197	952
Switzerland ... ... ...	—	—	14,644	59,914
Turkey ... ... ...	23,922	24,679	—	—
United States ... ... ...	7,703	7,947	—	—
Chile ... ... ...	19,142	19,748	—	—
China ... ... ...	3,101	3,199	—	—
Japan ... ... ...	9,117	9,406	—	—
French Pacific Possessions ...	12,152	12,536	—	—
Other Foreign Countries ...	3,972	4,098	482	2,637
Total to Foreign Countries	1,074,311	1,108,310	276,323	770,677
TOTAL ... ...	1,095,788	1,130,467	276,362	770,875

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Imports of Coke into Belgium.*

From	1913.		1919.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
United Kingdom ... ...	—	—	2	8
France ... ... ...	50,525	52,124	279	1,091
Germany ... ... ...	986,083	1,017,290	101	1,116
Netherlands ... ... ...	73,113	75,426	6,618	26,671
Other Foreign Countries ...	244	252	3	10
Total from Foreign Countries	1,109,965	1,145,092	7,001	28,888
TOTAL ... ... ...	1,109,965	1,145,092	7,003	28,896

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Production of Briquettes in Belgium.*

Year.	Quantity of Coal used in manufacture of Briquettes (long tons).	Production of Briquettes.	
		Quantity (long tons).	Value* (£).
1913 ... ... ...	2,329,244	2,566,715	2,367,421
1914 ... ... ...	1,610,681	1,770,776	1,485,551
1915 ... ... ...	1,333,390	1,466,152	1,348,612
1916 ... ... ...	1,737,480	1,904,709	1,815,357
1917 ... ... ...	884,512	966,149	1,260,406
1918 ... ... ...	1,023,817	1,122,269	2,033,856
1919 ... ... ...	2,274,902	2,506,942	7,556,893

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

*Exports of Briquettes from Belgium.*

To	1913.		1919.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
United Kingdom ... ... ...	2,406	2,172	2,361	10,361
Egypt ... ... ...	5,215	4,707	—	—
Union of South Africa ...	2,150	1,941	—	—
Australia ... ... ...	3,562	3,215	—	—
Total to British Possessions	13,333	12,035	2,361	10,361
France ... ... ...	412,622	372,471	148,220	459,567
Germany ... ... ...	12,909	11,653	290	793
Italy ... ... ...	—	—	18,203	77,320
Luxemburg ... ... ...	6,289	5,677	8,245	26,386
Netherlands ... ... ...	3,902	3,522	87,340	299,116
Portugal ... ... ...	2,756	2,488	1,811	7,018
Spain ... ... ...	7,077	6,389	18,454	70,952
Switzerland ... ... ...	5,469	4,936	51,665	170,282
Turkey ... ... ...	13,369	12,068	—	—
Belgian Congo ... ... ...	50,352	45,452	16,589	52,577
Morocco ... ... ...	4,259	3,844	—	—
United States ... ... ...	40,085	36,185	1,565	5,329
Argentina ... ... ...	4,831	4,361	1,181	4,758
Brazil ... ... ...	4,939	4,459	590	2,379
Chile ... ... ...	4,575	4,130	—	—
Peru ... ... ...	19,454	17,561	—	—
China ... ... ...	5,412	4,885	—	—
Other Foreign Countries ...	20,923	18,887	4,329	17,803
Total to Foreign Countries	619,223	558,968	358,482	1,194,280
<b>TOTAL</b> ... ...	<b>632,556</b>	<b>571,003</b>	<b>360,843</b>	<b>1,204,641</b>

\* Values converted to £ sterling at the rate of 25·22 francs = £1.

### Bosnia and Herzegovina.

Before the war, Bosnia and Herzegovina were administered by Austria; they now form part of Jugoslavia.

\* Practically all the workable coal in Bosnia and Herzegovina is confined to the Tertiary formation. The principal collieries are at Zenica, Kreka, Kakanj, Breza, and Banjaluka, and are worked by the State.

† The most important mines are situate in the north-east of Bosnia, about 1 mile west of Tuzla. The material worked is a lignite of low calorific value, but containing little ash. There are four principal seams, ranging up to 70 feet in thickness, which are worked open-cut and by adits and shafts. The mines are well equipped with electrical and steam plant, employ about 630 miners, and have an annual output exceeding 300,000 tons. The coal is used, almost exclusively, on the State railways.

The total reserve of brown coal is estimated to be as follows‡:

	Tons.
Actual reserve ...	1,700,000,000
Probable reserve ...	1,976,300,000
<b>TOTAL ...</b>	<b>3,676,300,000</b>

\* Coal Resources of the World, 1913, Vol. I, p. xv.

† The Coal Resources of Yugoslavia, by D. A. Wray, Geologist to the British Economic Mission in 1919. Iron and Coal Trades Review, June 17th, 1921, pp. 816-818.

‡ Coal Resources of the World, 1913, Vol. I, p. xvi.

*Analyses of Coals and Lignites from Bosnia and Herzegovina.*

No.	Locality.	Mois-ture.	Carbon.	Hydro-gen.	Oxygen and Nitro-gen.	Sul-phur.	Ash.	Calorific Value.	Remarks.
1	Grahovo (Zaseok) ...	Percent 1·90	Percent 50·40	Percent 3·20	Percent 10·90	Percent 7·40	Percent 26·20	Cals. 4,680	Coking.
2	Grahovo (Ugerci) ...	6·00	70·10	4·20	11·80	2·14	6·26	6,012	
3	Majevica (Veselnovac area)	1·75	66·04	4·80	14·04	5·78	7·59	5,683	
4	Majevica (Jasenica area)	5·65	66·10	5·04	17·31	1·98	3·97	5,686	
5	Zenica (II Lower seam)	16·90	45·16	3·60	18·81	6·65	14·88	3,858	
6	Zenica (Main seam) ...	11·80	57·48	4·46	17·23	3·09	5·94	4,664	
7	Do. do. ...	18·38	50·42	5·33	15·48	2·68	7·71		
8	Kakanj ...	7·40	62·86	4·51	13·32	2·14	10·26	5,037	
9	Breza ...	16·70	57·55	3·71	15·89	1·46	4·69	4,738	
10	Podovi near Gučja Gora	12·80	56·86	4·55	22·74	1·26	1·79	4,703	
11	Kobiljdel near Sarajevo	21·03	47·17	3·65	19·84	1·24	7·07		
12	Ugljevik ...	20·13	46·37	3·31	18·16	2·81	14·22		
13	Banovići ...	11·60	54·50	5·48	19·97	0·96	7·54	4,684	
14	Brezovedane near Žepče	13·15	58·46	3·85	18·99	0·56	4·99	4,799	Non-coking.
15	Teslić ...	14·90	56·11	3·92	16·57	1·24	7·26	4,480	
16	Luznica near Teslić ...	8·89	52·62	3·97	15·59	0·80	8·13		
17	Pribinić ...	12·60	60·00	4·05	17·25	0·89	5·21	5,675	
18	Snjegotina ...	10·75	60·10	4·69	21·11	0·43	2·92	5,270	
19	Banjaluka ...	21·82	47·62	3·29	15·32	4·61	7·04		
20	Fajtovci near Kamengrad	7·25	63·80	4·77	21·14	2·14	1·40	5,440	
21	Budanj near Foča ...	16·00	47·80	6·06	18·79	1·27	10·08	4,200	
22	Livno (Podkraj) ...	10·20	60·00	4·84	20·56	0·92	3·98	5,011	
23	Nevesinje ...	7·10	59·98	5·93	24·44	0·75	1·80	4,914	
24	Mostar ...	14·60	46·50	4·65	25·11	1·64	7·50	4,065	
25	Dolnji Gradac ...	13·31	48·20	5·78	28·84	0·72	8·15	3,998	
26	Tiškovac ...	12·20	40·10	3·80	31·10	0·49	12·31	3,851	
27	Tuzla (Kreka) Old Mine	24·72	46·86	3·61	17·06	0·25	7·50	4,097	
28	Do. ...	27·91	46·22	2·80	12·28	0·92	9·87		
29	Do. (New shaft) ...	27·78	45·92	3·17	12·74	0·77	9·62		
30	Do. (New mine) ...	26·80	46·50	3·65	12·71	0·84	9·50		
31	Kreka ...	24·72	46·86	3·61	17·06	[0·25]	7·75	4,000 to 4,500	
32	Zenitz ...	51 to 54							
33	Dolnja-Tuzla ...	24·70					7·75	4,568 to 4,790	

1-31.—Coal Resources of the World, 1913, Vol. III, pp. 1086-1087.

31, 32.—A. Habets. Revue Universelle des Mines, Vol. VIII, p. 307. Journ. Iron and Steel Inst. (London), 1905, I, p. 571.

33.—J. Grimmer. Das Kohlenvorkommen von Bosnien und Herzegowina. Journ. Iron and Steel Inst. (London), 1903, I, p. 562.

## Production of Lignite in Bosnia and Herzegovina.

Year.		Quantity (long tons).
1913	...	833,663
1914	...	793,864
1915	...	786,053
1916	...	913,326
1917	...	957,574
1918	...	...
1919	...	664,083

### Bulgaria.

On November 27, 1919, by the Treaty of Neuilly, Bulgaria ceded West Thrace to Greece and certain territory, the most important being that in the Strumnitz district, to Jugoslavia.

Anthracite, bituminous coal, and lignite are all found in Bulgaria. The two principal anthracite fields are situated, respectively, in the Isker valley, north of Sofia, and in the vicinity of Belogradtschik. The coal contains from 1·5 to 3·75 per cent. of volatile matter and a rather high percentage of ash. Bituminous coal is found in the Upper Balkans, the "Balkan basin" being very extensive, and containing three seams from one foot nine inches to 13 feet in thickness. The coal is very friable and gassy and is readily manufactured into briquettes or coke. At the western end of the basin it contains from 30 to 35 per cent. volatile matter, and in the central part from 15 to 20 per cent.

Lignite occurs in many isolated areas, viz. :—(1) Pernik-Bobovdol basin, (2) Tcham-déré basin, (3) Black Sea basin, (4) Lom basin, (5) Traquie basin, and (6) Sofia basin.

\* The total probable coal reserves, excluding the anthracite deposits, are estimated to be 387 million tons.

Lignite mines are worked by the State at Pernik and Bobovdol, the output of the former in 1911 being 241,371 tons, valued at £112,000. The latter colliery, situated about 10½ miles from the town of Doupnitzia, is far from any railway, and is worked to supply local wants only : it has an output of about 6,000 tons per annum.

The probable coal reserves of the country have been approximately reckoned as follows† :—

District.	Thousands of tons.			
Balkan Basin ...	...	...	...	30,000
Pernik ...	...	...	...	30,000
Bobovdol ...	...	...	...	7,000
Tcham-déré ...	...	...	...	650
Lom (Danube) ...	...	...	...	60,000
Black Sea ...	...	...	...	20,000
Tchernokonowo-Marüno	...	...	...	200,000
Katino ...	...	...	...	40,000
<hr/>				
TOTAL ...	...	...	...	387,650
<hr/>				

\* Coal Resources of the World, 1913, Vol. I, p. lxxxv.

† *Ibid*, 1913, Vol. II, p. 761.

*Analyses of Bulgarian Coals.\**

Locality.	Proximate Analysis.				Sulphur.	Calorific Value.
	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.		
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Cals.
Carboniferous Series— Valley of the Isker (Anthracite).	5·00	81·01	3·57	9·82	0·57	5,580
Cretaceous Series— Balkan basin— Amélie group	2·04	54·89	34·02	8·42		5,690
" Nadéjda "	0·86	64·07	30·35	4·72		8,209
	1·55	79·55	15·55	3·75		8,213
Tertiary Series— Pernik basin (Lignite)	14·99	39·70	37·61	7·70	2·25	5,787
Bobovdol basin (Lignite)	10·97	43·25	41·07	4·67	2·12	5,158
Tcham-déré basin (Lignite)	9·71	57·50	28·17	5·62	1·37	5,339
Black Sea basin (Lignite)	12·64	26·40	48·25	12·71	3·59	4,525
Lom(Danube) basin (Lignite)	13·64	29·79	40·46	16·11		4,050
Traquie basin (Lignite)	19·68	31·57	36·77	11·98		3,900

\* Coal Resources of the World, 1913, Vol. II, pp. 749–760.

*Production of Coal in Bulgaria.*

Year.	Lignite (long tons).	Coal (long tons).	Total (long tons).
1913 ... ... ...	341,940	10,056	351,996
1914 ... ... ...	402,053	12,349	414,402
1915 ... ... ...	506,982	18,205	525,187
1916 ... ... ...	613,658	15,873	629,531
1917 ... ... ...	730,292	18,746	749,038
1918 ... ... ...	636,210	25,850	662,060
1919* ... ... ...	541,161	19,679	560,840

\* Estimated.

**Denmark, the Faroe Islands, Iceland and Greenland.****Denmark.\***

In 1919, after a plebiscite, North Schleswig became part of Denmark.

*Peat.*†—It is estimated that the area of the Danish peat bogs is about 203,000 acres, containing 240,000,000 tons of peat, with a fuel value equal to 100,000,000 tons of coal.

\* Report on the Post-War Economic and Industrial Situation of Denmark, Department of Overseas Trade, London, 1920, Cmd. 955.

† General Report on the Economic Situation in Denmark, 1920, Department of Overseas Trade, London, 1921, p. 28.

*Production of Peat in Denmark.*

Year.					Quantity (long tons).
1913	...	...	...	...	
1914	...	...	...	...	118,000
1915	...	...	...	...	93,641
1916	...	...	...	...	276,000
1917	...	...	...	...	1,279,000
1918	...	...	...	...	1,968,000
1919	...	...	...	...	1,476,000

*Coal.*—No coal is at present mined in Denmark, but previous to 1880 there was a small coal mining industry on the island of Bornholm. An area of about 1,930 square miles in Jutland contains lignite, but neither it nor the coal of Bornholm is of high quality as fuel, and both disintegrate on exposure to the air.

*Analyses of Lignites from Denmark, the Faroe Islands, and Iceland.\**

Locality.	Ultimate Analyses of air-dried samples.					
	Carbon.	Hydro- gen.	Oxygen and Nitro- gen.	Sulphur.	Ash.	Mois- ture.
Jutland— Sandfeldgaard	46·9	3·6	20·5	3·6	5·4	20·0
Bornholm— Sorthat	49·8	3·5	16·6		15·6	14·5
Bagaa	47·3	2·9	14·6		8·3	26·9
Hasle	46·0	3·3	13·9		14·1	22·7
Faroe Islands (Suderöö)— Kvalbö— Glance coal (anthracitic)	60·9	4·1	20·3		2·5	12·2
Slate coal	49·7	3·2	16·4		20·0	10·7
Trangisvaag— Glance coal (anthracitic)	61·0	3·9	18·2		2·5	14·4
Slate coal	49·7	3·4	16·1		12·7	18·1
Iceland— Hredavatu, Borgartfjord	60·7	4·7	11·3		19·0	4·3
Briamslakr, Bardestrand	34·2	2·6	17·7		30·0	15·5
Vindfell, Vopnafjord	48·0	3·3	18·4		12·4	17·9

\* Coal Resources of the World, 1913, Vol. III. pp. 769–776.

*Imports of Coal and Coke into Denmark.*

	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Coal from— United Kingdom	2,883,987	2,997,714	3,066,569	2,258,138	811,507	1,044,675	1,558,108
Germany	186,170	129,210	107,950	499,950	633,708	676,058	272,446
United States	—	—	—	—	—	—	65,952
Coke from— United Kingdom	217,833	207,602	156,198	150,294	39,100	287,920	255,532
Germany	13,245	14,484	248,580	445,991	372,831		

### Iceland (Denmark).

By an Act which came into force on 1st December, 1918, Iceland became a free and independent State under the Danish-Icelandic Constitution.

Lignite beds occur in Iceland, especially in the north-western peninsula, where they have their greatest thickness. In this portion of the island some lignite is mined for local use.\* Average analyses give carbon 65·9-79·1 per cent., hydrogen 4·7-6·2 per cent., oxygen and nitrogen 29·4-14·7 per cent.

† A bed of lignite occurs at Nordfjord in Iceland, but it has not been worked to any great extent. Lignite also occurs in Borgarfjord, in the southern part of the island.

‡ The Stalfjall seam has been worked since 1916 by an Icelandic-Danish company, but always at a loss. Another seam was opened in 1915 at Tjörnes, in the north of Iceland, but it was not regularly worked until 1917, when the work was taken over by the Icelandic Government.

### Faroe Islands (Denmark).

§ The Faroe Group consists of 23 islands, on four of which coal has been found, but only on one of these, namely, Suderö, are the deposits extensive. The climate is very mild. Snow seldom lies for more than a few days, and the fjords are never ice-bound, being open all the year round. On Suderö there is one workable seam, extending over an area of more than 6,000 acres, and there is evidence of the occurrence of other seams. The seam is made up of layers of coal separated by partings of shale and brown clay, the aggregate thickness of the coal varying from 2 ft. to 7 ft. 10 in. It occurs in the north of the island in the mountains surrounding Trangisvaag and Kvalbö fjords, and is worked by adits. The seam yields two classes of coal, which is almost smokeless: a bright coal (glance coal) similar to Welsh anthracite and a coal (slate coal) similar to English steam coal. The mineral is considered to be a lignite of Tertiary age.

There is a considerable local demand for the coal, and it is possible that Suderö may become a local centre for coaling the fleet of British steam trawlers and Norwegian steam fishing-boats and whalers.

### Greenland (Denmark).

|| Important coal-seams have been found on Disko Island and Nugsuaks Peninsula in beds supposed to be of Upper Cretaceous

\* Fr. Johnstrup, Om Kullagene paa Færøerne samt Analyser af de i Danmark og de nordlige Bilande Fore-kommende Kul. Vidensk. Selsk. Overs. Kbh. 1873.

† Information furnished by the British Vice-Consul at Reykjavik.

‡ Mining Magazine (London), June, 1920, vol. 22, p. 376.

§ The Coalfields of the Faroe Islands, by G. A. Greener, Trans. Inst. Min. Engineers, Vol. XXVII (1903-4), pp. 331-342.

|| Coal Resources of the World, 1913, Vol. I, p. lxvi.

and Tertiary ages. A seam, about 3 feet in thickness, on the north shore of Disko Island, opposite Ritterbank, has been mined in a small way by the inhabitants.

*Analyses of Greenland Coal.*

Locality.	Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Sulphur.
Disko Island ...	Per cent. 0·75	Per cent. 47·75	Per cent. 45·45	Per cent. 5·50	Per cent. 0·55
Atanikerdluk ... (Nugsuaks Peninsula)	—	39·86	50·60	9·54	—

Coal is found also, in various districts on the west coast of Greenland, but it is of rather poor quality, and has little coherence. The heating power of Greenland coal is estimated at only one-half that of average English coal, mixed with which it works well in every respect, producing little ash and smoke. Since 1908, the workings at Karsuasak have produced about 1,500 tons of coal, which is only suitable for home consumption. The Cretaceous formation on the west coast contains the richest deposits of fossil plants known in the world. A large quantity of this vegetation has been transformed into lignite.

The total coal production of Greenland, in 1919, amounted to 2,125 tons.

**France.†**

By the Treaty of Versailles, Alsace and Lorraine were ceded by Germany to France. The coal mines in the Saar region have also been transferred to France, but without sovereignty.

*Peat.*—There is a small production of peat in France, amounting, in 1913, to 44,084 tons. During the first years of the war the production fell—that of 1915 being under 20,000 tons. Owing to the effort to make use of every form of fuel, the production rose to 30,899 tons in 1916, to 51,262 tons in 1917, and reached 126,970 tons in 1918, or nearly three times the pre-war production.

*Coal.*—France is relatively poor in coal and lignite, although coal is widely distributed throughout the country. There are in all about fifty coal-bearing areas and twenty containing lignite. The coalfields may be considered as divided into three groups—northern, central and southern.

† Statistique de l'industrie Minérale en France et en Algérie, 1914–18. Le Commerce de la France (Annual).

By far the most important coal area is the Valenciennes basin in the north-east corner of France, and this is divided into the Pas-de-Calais and Nord districts. A narrow off-shoot of the coalfield extends westward through Bruay and Marles and thence to Fléchinelle. This extension of the field was not invaded, and by intensive working the French succeeded in largely increasing the output of the collieries situated in this narrow offshoot.

The coal ranges in character from long-flame bituminous coal to semi-anthracite, with a fair proportion of coking coal.

There are 90 coal beds with an aggregate thickness of 250 feet, but generally not more than two-thirds of these beds are present at any one point, and many of them are not of workable thickness; the total thickness of the workable coal does not usually exceed 150 feet, and most of the beds are less than 3 feet in thickness. In some instances, two beds unite, giving, locally, a thickness of from 9 to 12 feet. At Lens, where the conditions are typical, the total thickness of coal-measures is 4,300 feet, with 51 workable beds, containing 154 feet of coal.

The Loire basin is the most important area of the central group, and contains the St. Etienne coalfield. The Alais basin is the most important area of the southern group.

The Fuveau basin is the principal lignite area. From 5 to 6 seams of lignite occur in 569 feet of strata; the lowest seam is of most importance, and varies from 2 feet 5 inches to 6 feet 6 inches in thickness, while the other seams are all less than 3 feet 3 inches thick. The aggregate thickness of lignite is from 6 feet 6 inches to 16 feet 3 inches.

According to the Central Committee of France for Collieries, 220 pits and shafts, belonging to 20 operating companies, were destroyed by Germany. All surface installations were destroyed in detail.

The transfer of the Saar coal mines includes undeveloped deposits, whether formerly belonging to the Prussian State, the Bavarian State, or private interests. The chief properties were the Prussian State mines, there being only a few privately owned mines. In 1913 the Saar coalfield produced about 12,200,000 tons of coal. Bavaria's two largest collieries were included in the transfer, as well as the mines in the Lorraine portion of the Saar coalfield.

After a period of 15 years, the inhabitants of the Saar territory are to determine by vote whether they desire: (a) the maintenance of the régime established by the present Treaty, (b) union with France, or (c) union with Germany.

A period of ten years is indicated by the Treaty for the restoration and recovery of output of the destroyed mines in the Nord and the Pas-de-Calais coalfields. This takes into account the time required for the renewal of transportation facilities, the

clearing away of the tangle of concrete debris and twisted steel at the mines, the provision of adequate housing for workmen, together with the reconstruction of mine-buildings and equipment generally.

In 1919, owing to the difficulty in obtaining machinery and supplies, the French Government, in conjunction with the Central Committee for Collieries, established a central office for the purchase of all materials needed in the reconstruction of destroyed industries, and this organization (*Comptoir central d'achats industriels pour les régions envahies*), which later came under the Ministry of Industrial Reconstruction, purchases all materials and equipment and allocates them to the different industries and mines; but each mining company has been permitted to use its own discretion in the execution of the work of rehabilitation.

There has been reluctance on the part of the Government to permit the purchase of machinery outside of France on two accounts:—(1) the adverse rate of exchange and (2) the desire to avoid increasing the debt of France to other countries. However, it is expected that German mining machinery may be furnished as part of the reparation.

In 1913 France produced about 40 million tons of coal and rather more than  $\frac{3}{4}$  million tons of lignite. During the same year, the Nord and Pas-de-Calais coalfields produced about  $27\frac{1}{2}$  million tons of coal, or about 69 per cent. of the total coal produced by France, and equal to about 42 per cent. of the total consumption.

In 1914 the production fell to 27,085,693 tons, and in 1915 there was a further reduction to 19,219,010 tons. In 1916 there was an increase to 20,967,590, and in 1917 a production of 28,450,695 tons was reached. In 1918 the production fell to 25,837,062 tons, and in 1919 to 22,080,000 tons.

The recovery, which began in 1915, was the result of intensive working of the mines. In the uninvaded portion of the Pas-de-Calais coalfield the production of the half-a-dozen collieries left to the French was raised from 2,400 to about 3,800 tons per day. In 1915 the production was 7,264,000 tons; in 1916 it was 8,063,000 tons; and in 1917 it rose to 11,266,000 tons. During the period 1913 to 1917 the production of the Loire coalfield rose from 3,389,000 tons to 4,061,000 tons; and "other coalfields" decreased from 33,079,000 tons to 21,756,000 tons. After the Armistice there was a decrease of output due to the removal of miners who had been transferred from other mining districts, and to the change from 3 to 2 eight-hour working shifts per day.

The prices, per ton, of the various coals consumed in France in September, 1919, are stated to have been as follows:—French 56s., German 40s., British 120s. to 128s., American 224s.\*

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\* Destruction of French Mines and Plants and their Rehabilitation, by G. S. Rice, Journ. of Franklin Inst., June, 1920, p. 778.

*Fuel Control.*—The scarcity of fuel during the War rendered systematic control of the supply and distribution of coal absolutely indispensable. On April 22nd, 1916, a law was passed entitled “The Taxation of Coal and the Limitation of Freights for the Transport of Coal under the French Flag.” The first article of this law directed the Minister of Public Works to issue decrees fixing, for coal obtained from French mines, the maximum selling price at the pithead, a special price being established for each quality of coal and for each coalfield. The second article provided that the same decrees should fix for each port the maximum selling price for imported coal. A National Coal Bureau was formed, under the Ministry of Industrial Reconstruction, to carry out the distribution of coal. In consequence of the continued difficulty of the fuel situation, the French Government extended the period covered by the legislation relating to the supply and distribution of coal to December 31st, 1921.

*Production of Peat in France.*

Year.						Quantity (long tons).
1913	...	...	...	...	...	44,080
1914	...	...	...	...	...	36,126
1915	...	...	...	...	...	19,773
1916	...	...	...	...	...	30,899
1917	...	...	...	...	...	51,262
1918	...	...	...	...	...	126,970
1919	...	...	...	...	...	...

*Imports and Exports of Peat into and from France.*

Year.	Imports.				Exports.			
	Peat for Litter.		Peat for Fuel.		Peat for Litter.		Peat for Fuel.	
	Quantity (long tons).	Value* (£).						
1913	...	24,821	22,505	32	77	18	17	12
1914	...	13,525	12,263	10	23	305	308	2
1915	...	2,541	2,457	40	38	1	—	—
1916	...	1,113	998	1	—	—	—	—
1917	...	651	728	—	—	—	—	2
1918	...	127	149	—	—	—	33	112
1919	...	256	31	1,077	4,063	14	—	10
								31

\* Values converted to £ sterling at the average rate of exchange for each year.

*Estimated Coal Reserves in France.\**

	Reserves within a depth of 3,900 feet (in thousands of tons).			Possible Reserves be- tween 3,900 and 5,850 feet in depth (in thousands of tons).
	Actual.	Probable.	Possible.	
Anthracitic coals ... ...	581,100	926,900	1,223,700	540,000
Bituminous coals ... ...	3,622,225	2,966,700	3,662,060	2,430,000
Lignite ... ...	301,000	410,200	920,800	—
<b>TOTALS</b> ... ...	<b>4,504,325</b>	<b>4,303,800</b>	<b>5,806,500</b>	<b>2,970,000</b>

\* Coal Resources of the World, 1913, Vol. II, p. 711.

*Analyses of French\* Coals.*

No.	Coalfield and Company.	Concession or Mine.	Description of Coal.	Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Sulphur.	Calorific Value.
1	<i>Bassin du Nord</i> — Flines-les-Raches...	Flines-les-Raches	... Anthracite	Per cent. 90	Per cent. 62 to 54	Per cent. 7	Per cent. 1.25 to 1.59	Per cent.	Cals.
2	<i>Bassin de la Loire</i> — Marles ...	Marles ...	Bituminous ...	1 to 3	62 to 54	32 to 38	4 to 6		
3	Haute-Cappe ...	La Cappe, &c.	Do.		20 to 22	6 to 12			
4	La Loire ...	La Chana, &c.	Do.		20 to 35	5 to 12			7,500
5	La Péronnière ...	La Péronnière, &c.	Do.		13	13 to 15			
6	Do.	Do.	Do.		9 to 10	8 to 10			
7	Do.	Do.	Do.		9 to 10	13 to 15			
8	Sainte-Foy-L'Argentière ...	Sainte-Foy-L'Argentière	Do.		26	24			
9	Saint-Etienne ...	La Roche, &c.	Do.		20 to 22	10 to 15			
10	<i>Bassin du Gard</i> — Barjac ...	Barjac ...	Lignite...	12	40	15 to 20			
11	Mines de Cessons ...	Cessons et Trebiau	Authracite		9 to 10	10 to 18			
12	Nord d'Alais ...	St. Martin de Valgalgues	Do.		8.5 to 12	3 to 5			
13	Rochebelle...	Rochebelle	Bituminous		14 to 16	8 to 12			
14	Do.	Do.	Anthracite		9 to 10	4 to 8			
15	Saint-Germain-Alais	St. Germain - Alais et Provençal	Anthracite		9	10			
16	<i>Bassin de l'Hérault</i> — Graissessac ...	St. Gervais, &c.	Anthracitic and Bituminous.		16 to 19	15			
17	Do.	Do.	Do.		16 to 19	11 to 12			
18	Do.	Do.	Do.		17 to 18	12 to 13			7,694

<i>Bassin des Bouches-du-Rhône</i>	<i>Bouches-du-Rhône</i>	Grande, &c.	...	Lignite...	51·25	41·07	7·68	5,500 to 6,000
Charbonnages des Bouches-du-Rhône.	Coudoux ...	Do.	...	Do.	...	25		
Morlin du Point ...	Peypin et St. Savournin-Nord.	Do.	...	Do.	...	42		
Valdonne ...	...	Do.	...	Do.	...		5,500 to 6,000	
<i>Bassin des Basses-Alpes</i>	Dauphin, &c.	...	Do.	...	...	35 to 40	5,000 to 6,000	
Alpes ...	...	Do.	...	Do.	...			
<i>Bassins du Tarn et de l'Aveyron</i>	Aubin ...	Bituminous	...	62 to 67	33 to 38	6 to 10	8,627	
Acieries de France ...	St. Michel, Decazeville ...	Do.	...	34 to 36	8 to 10		8,500	
Arège ...	Decazeville ...	Do.	...	35	8 to 10			
Commentry - Fourchambault et Decazeville.	...	...	Do.	...				
Vieille-Montagne ...	La Pianquette ...	...	Do.	...	60 to 65	32	6,500	
<i>Bassin de l'Ouest</i> —Faymoreau ...	St. Laurs, &c. ...	...	Do.	...	18	20		
<i>Bassin de la Bourgogne, des Vosges Méridionales et du Nivernais</i>	La Chapelle-sous-Dun, et des Moquets.	...	8·60	48·43	34·73	7·90	0·34	
La Chapelle-sous-Dun et des Moquets.	Perrecy ...	...	Anthracite	...	10 to 11	30		
Perrecy ...	...	...	...	...				
<i>Bassin du Bougnois et de l'Auvergne</i>	Bert et Montcombreux ...	Bituminous	...	70 to 72	26	21		
Bert et Montcombreux ...	St. Hilaire ...	Do.	...	30 to 35	28 to 30	20 to 22		
Bourbon-Saint-Hilaire ...	Buxière et La Conrole ...	Do.	...	8 to 10	30 to 35	15 to 20		
Centre ...	Charbonnier ...	Anthracite	...	80 to 82	8 to 10	4 to 10		
Chatillon, Commentry et Neuves-Maisons.	St. Eloy (Puy de Dôme) ...	Bituminous	...	36 to 40	9 to 12			
Do.	Des Ferrières (Allier) ...	Do.	...	30 to 33	8 to 10			
Do.	Fins-Noyant (Allier) ...	Do.	...	28 to 34	7 to 8			

No.	Coalfield and Company.	Concession or Mine.	Description of Coal.	Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Sulphur.	Calorific Value.	Cals.
				Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
<i>Bassin du Bourbonnais et de L'Auvergne—cont.</i>										
37	Commentry-Fourchaubault et Decazeville.	Campagnac	... Bituminous	...	80	32	6 to 8			
38	Messeix	... Messeix	... Anthracite	...	82.27	5.50	10			
39	Montgirod	... Montgirod	... Do.	...	2	24	9.80	0.43		7,950
40	Périgord	... Bassin Anthracifère de l'Isère—	... Marsanges et La Chalede	... Bituminous			15			
41	Chasse (Isère)	... Grandchamp	... Do.	...		20	32			
42	Communay	... Communay	... Anthracite	...		7 to 9	8 to 10			
43	Dauphiné	... Dauphiné	... Do.	...			15			
44	Do.	... Do.	... Combe-Charbonnière, &c.	...			12			
45	Do.	... Do.	... Do.	...			9			
46	Do.	... Do.	... Do.	...			5			
47	La Mure (Isère)	... Villaret	... Do.	...	4.87	95.29	2.26	2.45		
48	Do.	... La Motte	... Do.	...	4.72	96.27	1.77	1.96	1.20	8,315
49	Produits Chimiques et d'charbonnages.	Estarpey	... Do.	...	4.80	76.35	5.70	12.25	1.24	8,229
									0.85	

\* Note.—In France, the composition of coal is usually expressed on the "ash and moisture-free" basis; consequently, only the percentage of volatile matter need be stated, as the percentage of fixed carbon is the difference between that figure and 100. The percentages of moisture, ash and sulphur, and the calorific value are usually based upon the "air-dried" sample. In the case of the analyses given above, Nos. 1, 19, 28, 33, 38, 39, 47, 48 and 49 are clearly exceptions to this rule.

*Production of Coal in France.*

Year.	Quantity (long tons).		
	Coal, including Anthracite.	Lignite.	Total.
1913 ... ... ...	39,407,741	780,052	40,187,793
1914 ... ... ...	26,409,539	676,154	27,085,693
1915 ... ... ...	18,552,509	666,501	19,219,010
1916 ... ... ...	20,211,462	756,128	20,967,590
1917 ... ... ...	27,311,310	1,139,385	28,450,695
1918 ... ... ...	24,540,342	1,296,720	25,837,062
1919* ... ... ...	21,200,000	880,000	22,080,000

\* Provisional figures, subject to revision.

*Exports of Coal from France.*

To	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Belgium ...	7,747,77	370,306	40,375	54,813	43,667	253	349
Germany ...	7,735	2,440	—	—	—	—	—
Italy ...	48,886	16,181	—	1,375	8,855	1,587,551	83,459
Spain ...	26,604	18,506	1,397	369	37	1,951	720
Switzerland	157,290	108,163	3,975	2,052	12,711	61,814	242,210
Algeria ...	3,835	2,687	—	—	—	—	—
Tunis ...	4,598	13,056	—	—	—	—	—
French Colonies...	5,622	4,983	—	—	—	—	—
Other Countries...	79,909	65,448	49,774	52,456	53,790	112,845	122,450
<b>TOTAL...</b>	<b>1,181,956</b>	<b>601,720</b>	<b>95,521</b>	<b>111,065</b>	<b>119,060</b>	<b>1,764,414</b>	<b>449,188</b>
Bunker Coal ...	151,458	88,665	46,136	69,718	85,017	36,328	76,970
Value (£)* ...	1,318,859	695,540	53,666	720,499	1,041,973	8,884,242	2,322,115

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Coal into France.*

From	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom ...	11,076,808	10,586,145	18,614,161	18,410,410	15,556,547	15,120,399	14,084,018
Belgium ...	3,610,423	1,999,440	44	14	16	5	1,677,064
Germany ...	3,434,477	2,388,718	725	—	—	—	—
Italy ...	4,096	—	—	—	—	—	—
Netherlands ...	270,831	174,378	—	—	—	—	—
Spain ...	1,511	—	—	—	—	—	—
United States ...	11,394	29,954	143,061	53,017	56,516	17,372	293,048
French Colonies ...	90	49	—	—	—	—	—
Other Countries ...	1,593	3,588	3,301	9,545	2,342	1,323	2,746,382
<b>TOTAL...</b>	<b>18,410,223</b>	<b>15,182,272</b>	<b>18,761,292</b>	<b>18,472,986</b>	<b>15,615,421</b>	<b>15,189,039</b>	<b>18,800,512</b>
Value (£)* ...	18,176,761	14,683,830	39,634,392	70,279,715	73,950,564	67,796,602	77,046,772

\* Values converted to £ sterling at the average rate of exchange for each year.

*Analyses of Coke.\**

—	Carbon.	Sulphur.	Phos-phorus.	Ash.
St. Etienne ... ... ...	Per cent. 86·60	Per cent. 0·40	Per cent. —	Per cent. 13·00
Carmaux, washed ... ... ...	93·13	—	trace	6·38
Béthune ... ... ...	91·17	0·30	0·028	8·50

\* *Journ. Iron and Steel Inst. (London), 1904, Pt. 1, p. 497 (O. Simmersbach).*

*Production of Metallurgical Coke in France.*

Year.	Number of Ovens.	Coal Used.			Coke Produced. Quantity (long tons).	
		Quantity (long tons).				
		Domestic.	Foreign.	Total.		
1913 ... ... ...	5,049	2,590,060	388,801	2,978,861	3,962,698	
1914 ... ... ...	1,087	837,722	251,395	1,089,117	2,238,510	
1915 ... ... ...	1,508	1,247,025	614,131	1,861,156	820,408	
1916 ... ... ...	1,638	1,466,299	519,653	1,985,952	1,389,013	
1917 ... ... ...	1,822	1,655,450	719,005	2,374,455	1,509,382	
1918 ... ... ...					1,843,852	
1919 ... ... ...					1,600,000	

\* Provisional figure, subject to revision.

*Imports and Exports of Coke into and from France.*

Year.	Imports.		Exports.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ... ...	3,020,698	3,773,639	227,807	302,951
1914 ... ... ...	1,434,500	1,676,447	103,743	129,603
1915 ... ... ...	221,302	697,014	31,661	121,618
1916 ... ... ...	778,280	4,229,911	17,698	99,394
1917 ... ... ...	660,322	4,592,938	22,983	168,365
1918 ... ... ...	508,818	2,896,527	35,725	219,642
1919 ... ... ...	1,792,406	10,170,688	54,193	341,687

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports and Exports of Briquettes into and from France.*

Year.	Imports.		Exports.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ... ...	1,068,541	1,205,703	203,353	245,847
1914 ... ... ...	737,022	787,077	104,624	120,162
1915 ... ... ...	394,477	1,060,620	61,415	193,424
1916 ... ... ...	637,674	2,425,989	24,573	97,932
1917 ... ... ...	741,664	3,786,713	42,747	234,074
1918 ... ... ...	817,372	3,970,612	71,828	381,628
1919 ... ... ...	1,151,785	4,901,706	45,993	217,494

\* Values converted to £ sterling at the average rate of exchange for each year.

**Germany.***Peat.*

The following table gives a list of the chief peat-bogs of Germany (pre-war territory), with their approximate extent :—

	Square Miles.			
Hanover ...	...	...	...	2,223
Oldenburg ...	...	...	...	1,544
Pomerania ...	...	...	...	1,204
—Posen ...	...	...	...	811
East Prussia ...	...	...	...	772
—Schleswig-Holstein ...	...	...	...	695
Bavaria ...	...	...	...	482
Rhineland ...	...	...	...	386
Westphalia ...	...	...	...	328
Silesia ...	...	...	...	328
—West Prussia ...	...	...	...	328
Saxony ...	...	...	...	328
Brandenburg ...	...	...	...	286
Württemberg ...	...	...	...	193
Baden ...	...	...	...	
Total ...	...	...	9,908	

As a consequence of the war, Posen, part of Silesia, and the greater part of West Prussia have been transferred to Poland, and part of Schleswig-Holstein has been transferred to Denmark.

A number of methods have been proposed for the winning and machine-treatment of peat on a large scale. Of these, according to A. Hausding\* only one has had any general commercial success. In this process, the freshly won peat is brought to

\* A handbook on the Winning and the Utilization of Peat, by A. Hausding, translated by Hugh Ryan, 1921, p. 69.

machines which tear up the root and plant fibres, destroy the natural, uneven, felty formation of the peat, and by thoroughly mixing, transform the peat into a thick moss, which is as uniform as possible, and which :—

- (a) without previous addition of water, is, while thick and kneadable, stroked by hand into moulds, or is formed by the mixing machines themselves into a thick, endless, sausage-like band, which is divided into sods before it is spread for air-drying (Machine-formed peat : Weber's Method);
- (b) after previous addition of water, is allowed to flow out as mud or pulp on an open levelled ground in a layer of uniform thickness which is cut into sods before it is fully air-dried (Machine-pulp or Machine-dough Peat, sometimes also called Machine-mud peat : Hanover-Oldenburg method).

No statistics relating to the production of peat in Germany are available.

/ The principal territorial changes due to the war, affecting Germany's coal resources, are the cession by Germany to France of Alsace and Lorraine and the coal mines of the Saar basin (*see* France). To Belgium, Germany has lost Moresnet and Malmedy. Parts of Posen and West Prussia and Upper Silesia are transferred to Poland.

Germany has relinquished all her colonies, which are now administered as follows :—The Cameroons and Togoland, jointly by France and Great Britain; German East Africa (now Tanganyika), by Great Britain; German South-West Africa (now South-West Africa Protectorate), by the Union of South Africa; German Pacific Possessions north of the Equator, by Japan, south of the Equator by New Zealand and the Commonwealth of Australia.

Germany contains very large areas of both bituminous coal and brown coal or lignite, and is the largest producer of the latter at the present time; the output of brown coal in 1919 was about 92 million tons. The best varieties of brown coal are found in Lower Silesia, in the Prussian provinces of Saxony and Posen, in Brunswick, Thuringia, Hesse, the Taunus, and near Cassel. In the hills that form a semi-circle around the city of Cologne there is a belt, about 3 miles in width by 15 miles in length, which contains a seam of brown coal varying in thickness from 60 to more than 300 feet, the average being about 100 feet. The brown coal is chiefly converted into briquettes.

The rapid development of the German brown-coal industry is remarkable. The production of brown coal in the German Empire rose from 43,765,000 tons in 1901 to 92,320,000 tons in 1919, while the production of brown-coal briquettes (including "wet compressed blocks") rose, during the same period, from 9,104,000

tons to 19,124,000 tons. The principal brown-coal briquetting districts are those of Halle and Bonn which together comprise about 78 per cent. of the industry. Approximately 3 tons of raw brown-coal are employed in the production of 1 ton of briquettes (2 tons being for material, and 1 ton for fuel : the 2 tons for material are reduced to about 1 ton by loss of weight in drying, by loss from dust, which is considerable, and by other losses) so that about 58 million tons, or 63 per cent., of the total German production of brown coal in 1919, were used in the industry, leaving about 34 million tons for consumption, chiefly for household purposes, in the immediate locality of production, as the uncompressed brown-coal has too little cohesion to bear handling. The production of "wet compressed blocks" is relatively very small.

Formerly, the use of brown-coal briquettes was restricted, almost entirely, to household purposes, particularly in the large towns, such as Berlin and Dresden, but latterly their use in many industrial and commercial undertakings has widely extended. Their employment on railways and ships is limited, on account of their low calorific value compared with coal and coal-briquettes. "Wet compressed blocks" made from brown coal are friable, and they can be used only for household fuel, and in brick-kilns and other industries in the vicinity of the place of their manufacture.

The brown coals of Germany are of Tertiary age, and they permit of briquetting without the addition of a binding material. The average composition, as mined, of German brown-coal is shown by the following table\* :—

—	1.	2.	3.	4.	5.
	Per cent.				
Carbon ... ... ...	30·77	28·31	32·02	33·72	27·46
Hydrogen ... ... ...	2·47	2·44	2·68	2·50	2·01
Oxygen, nitrogen, and volatile sulphur.	13·00	12·87	12·83	13·14	11·16
Ash ... ... ...	4·92	6·45	6·50	5·93	2·89
Moisture ... ... ...	48·84	49·93	45·97	44·71	56·48
TOTAL ... ... ...	100·00	100·00	100·00	100·00	100·00

1. Mark and Niederlausitz.
2. Kingdom of Saxony and Altenburg.
3. Province of Saxony, Anhalt, and Brunswick.
4. Hanover and Hesse.
5. Lower Rhine (Hills).

Disregarding exceptional cases, the analyses of German brown-coal briquettes are fairly regular, and the following limiting

\* A Handbook of Briquetting, by G. Franke : translated by F. C. A. H. Lantsberry, 1916, Vol. I, p. 277.

values are given by Neuman.\* The limiting values for raw brown-coal are given for comparison :—

—	Mois-ture.	Ash.	Fixed Carbon.	Volatile Matter.	Calorific Value.
<i>Raw brown-coals.</i>					
Saxon coal ... ...	Per cent. 42-56	Per cent. 2-10	Per cent. 11-21	Per cent. 27-30	Cals. 2,200-3,200
Lausitz coal ... ...	46-58	2-7	19-29	21-24	2,000-2,700
Rhenish coal ... ...	52-60	2-4	18-23	20-27	2,100-2,400
<i>Brown-coal briquettes.</i>					
Saxon briquettes ... ...	11-18	7-11	32-39	42-45	4,500-5,500
Lausitz briquettes ... ...	13-17	4-6	37-40	40-43	4,600-5,200

Speaking generally, the calorific value of the briquettes is about double that of the raw brown-coal : and, taking the calorific value of German coal (steinkohle) as mined, brown coal (braunkohle) as mined, and brown-coal briquettes, as 7,000 calories, 2,500 calories, and 5,000 calories, respectively, then 1 ton of coal is equivalent, roughly to 2·8 tons of raw brown-coal, and to 1·4 ton of brown-coal briquettes.

The customary method of briquetting brown coal in Germany is briefly as follows :—The brown coal is got either in open workings after a preliminary removal of the covering soil, or by mining, mostly with picks. It is transported to the briquetting factory by means of small wagons hauled up a rising track by a chain or, less often, a wire rope ; or by means of an aerial cable-way with tipping buckets. The briquetting factory is usually quite close to the mine or workings, or is connected with the railway. The crude brown-coal delivered to the factory undergoes “wet preparation,” so called because it is carried out upon the material in its natural state containing all the pit-moisture. It is submitted to mechanical coarse and fine grinding combined with repeated sieving, and is separated, on the one hand, into boiler fuel, which contains, as far as possible all the impure coal unsuitable for briquetting, the coarse pieces of brown coal, pieces of wood, etc. ; on the other hand, into briquetting coal of medium, coarse and fine grain. The first-named passes to the boiler house, while the briquetting coal is delivered on the coal floor of the drying plant and thence to the drying appliances below, which are heated for the most part by waste and fresh steam. It is dried until the moisture-content is reduced to 12 to 17 per cent. when it is pressed to form either domestic or industrial briquettes.

Although several types of press are in use for briquetting coal, only the Exter rope-press is employed for briquetting brown coal. The Exter rope-press is a single-press system with a horizontal open channel-mould into which a press-stamp is pushed and then withdrawn alternately. It was first applied in Ireland, and then

\* G. Franke, *Loc. cit.*, p. 299.

introduced into Bavaria, for the working-up of peat, and soon came into general use for pressing brown-coal briquettes.

In the rope (or sausage) type of press, the plastic briquetting material is forced by the forward motion of a reciprocally acting pressure-stamp into an elongated channel, open at both ends. On the backward motion of the stamp a certain quantity of the briquetting material falls into the mould, while during the forward motion the stamp compresses this material against the previously compressed mass and pushes the whole briquette rope further along the mould. During the compression the principal resistance to the stamp arises from the friction between the mass being compressed, the briquette rope and the walls of the mould. This friction is very great and increases with the length of the mould channel.

In the manufacture of brown-coal briquettes with the Exter press, each forward motion of the pressure-stamp produces a finished briquette. Each briquette as it emerges from the channel-mould is in immediate contact with the briquette previously made and pushes the rope of briquettes along an iron briquette-gutter, a distance equal to its own thickness. The briquette-gutter extends to the loading track or storage shed, often 100 yards distant. Through a certain portion of the length of the channel-mould the upper and lower surfaces converge slightly, thus increasing the frictional resistance and causing further compression and strengthening of the freshly pressed briquettes. The maximum pressure to which the briquettes are submitted is stated to be from 8 to 10 tons per square inch. The output of a press working at the rate of 90 strokes per minute amounts to 129,600 seven-inch briquettes, which is equal to about 44 tons per 24 hours.

The capability of German brown-coal to be briquetted by means of high pressure without the addition of a binding material is usually attributed :—

- (1) to its large content of apparently chemically combined water: it is stated that, as a general rule, the brown coal as mined contains 20 per cent. of "water of hydration," out of a total water content of 40 to 60 per cent.;
- (2) to the presence in the brown coal of tar-producing substance which, under the great pressure and high temperature caused by friction, exercises a binding influence.

Some authorities consider, however, that the characteristic probably depends on the surface tension of the particles; that under pressure the particles are brought into intimate contact and the air forced from between them, while the large internal spaces are filled with coal dust and the small spaces are filled with moisture. The degree of granulation, hardness, and strength of a material are of importance in determining its capability of being briquetted.

The following table gives the chief coalfields (bituminous coal), and shows the percentage which each contributed to the total output of 1918 :—

			Percentage of total output of coal (excluding brown coal) in 1918.
1. Ruhr (Lower Rhine, or Westphalia)	...	...	59·77
2. Upper Silesia	...	...	24·85
3. Saar (including Bavarian Palatinate and Alsace-Lorraine)	...	...	5·94
4. Lower Silesia	...	...	2·90
5. Saxony	...	...	2·87
6. Aachen (left bank of the Rhine)	...	...	1·57
Small districts	...	...	2·10
Total	...	...	100·00

The three principal coal-mining districts of Germany are : (1) The Lower Rhine and Westphalian Basin, which is by far the most important ; (2) Silesia, and especially Upper Silesia ; (3) the Rhenish district in the neighbourhood of Saarbrücken and Aachen.

The following table shows the general distribution of the different classes of coal among the several coalfields and their estimated reserves\* :—

District.	Age.	Actual Reserves.	Probable and Possible Reserves.
Saar	Carboniferous, mainly	16,548	†
Westphalia and Rhine Province	Carboniferous	56,344	157,222
Lower Silesia	Carboniferous	718	2,226
Upper Silesia	Carboniferous	10,325	155,062
Saxony	Carboniferous and Permian	225	†
Left bank of the Rhine	Carboniferous	10,458	
Other districts	Cretaceous, etc.	247	†
	Total	94,865	315,110
BROWN COAL.			
Prussia and North German States	Eocene to Miocene	6,069·2	3,675·9
Saxony	Oligocene to Miocene	3,000	
Bavaria	Tertiary	75	293·6
Hesse	Tertiary	169·6	98·9
	<b>TOTAL</b>	<b>9,313·8</b>	<b>4,068·4</b>

\* Coal Resources of the World, 1913, Vol. 1, p. lxxxix.

† Possible reserve, large.

‡ Possible reserve, considerable.

*Analyses of German Coals.*

No.	Coalfield.	Proximate Analysis.				Ultimate Analysis.				Calorific Value. Cals.
		Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Moisture.	Carbon.	Hydrogen.	Oxygen and Nitrogen.	
1	<i>Rhenish-Westphalia</i> —	CoAL.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Cals.
2	Alma Mine, Seam 4...	...	...	...	...	3·00	79·82	4·96	6·04	5·36
3	President Mine	2·4	66·1	20·7	10·8	87·79	5·03	7·50	7·24	7,493
4	Prosper III ...	...	...	...	...	85·62	4·65	7·64	2·09	5
5	Essen ...	...	...	...	...	85·90	4·56	6·33	3·21	2·76
6	Bochum ...	...	...	...	...	73·20	4·93	19·11	2·76	...
7	<i>Upper Silesia</i> —	...	...	...	...	84·59	4·35	5·33	6·01	...
8	<i>Lower Silesia</i> —	...	...	...	...	72·38	4·46	15·05	8·11	...
9	<i>Saar</i> —	...	...	...	...	64·0	4·7	...	...	6·266
10	Dudweiler II	3·8	53·1	22·9	20·2	...	...	...	...	7,024
11	Louisenthal ...	4·8	53·9	34·0	7·3	...	...	...	...	...
12	Beden-Itzenplitz ...	4·2	56·3	31·9	7·6	...	...	...	...	...
13	<i>Saxony</i> —	...	...	...	...	83·42	5·41	10·30	Sulphur. 0·87	8,308
14	Zwickau District ...	8·62	56·81	32·38	2·19	83·92	5·24	10·18	0·66	8,287
15	Lugau Oelsnitz Dis-trict.	9·95	57·28	31·34	1·43	...	...	...	...	8,383
16	Döhlen District	5·71	54·95	30·93	8·41	83·28 <sup>a</sup>	5·72	9·73	1·27	...
17	Niederwürschnitz ...	...	...	...	...	82·34	4·73	12·93	12·65	...
	Zwickau ...	...	...	...	...	82·59	4·76	...	...	...

\* Calorific value of "moisture and ash-free" coal.

No.	Coalfield.	Proximate Analysis.					Ultimate Analysis.					Calorific Value.
		Moisture.	Fixed Carbon.	Volatile matter.	Ash.	Moisture.	Carbon.	Hydrogen.	Oxygen and Nitrogen.	Ash.	Cals.	
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
18	COAL— <i>cont.</i> <i>Aachen—Löthringen</i> (Lorraine Annexée)—	7.9	44.4	27.4	20.3							
19	Petite Rosselle	7.0	51.4	33.9	7.7							
20	La Houve II	...	...	...	...							
21	L'Hôpital I	6.8	54.2	31.6	7.4							
	<b>BROWN COAL.</b>											
22	<i>Prussia—Cologne</i>	...	53.73	18.08	23.21	4.98	67.64	5.60	22.64	4.12	6,702	
23	<i>Saxony—Kulkwitz</i>	...	53.12	18.08	25.31	3.49	68.81	6.36	23.93	0.90	6,666	*
24	<i>Neukirchen-Wyhra</i>	...	56.52	19.07	21.60	3.81	67.06	5.13	25.94	1.87	6,434	*
25	<i>Grandorf</i>	...	51.31	17.97	25.80	4.92	67.23	5.36	22.75	4.66	6,506	
26	<i>Zittau.</i>	...	...	...	...	...	...	...	...	...	...	
27	<i>Bavaria—Pemburg</i>	...	...	...	...	...	...	...	...	...	...	
28	<i>Hesse—Laubach</i>	...	...	...	...	...	...	...	...	...	...	
29	<i>Meissner</i>	...	...	...	...	...	...	...	...	...	...	

\* Calorific value of "moisture and ash-free" coal.

1-3, 5-7, 9, 16-18, 22.—Heat, Energy and Fuels, by H. V. Jüptner, 1908.  
4, 10-12, 19-21.—Atlas Générale des Houillères, by E. Gruner and G. Bousquet, Part 2 (text), 1911.  
8, 13-15, 23-29.—Coal Resources of the World, 1913, Vol. III.

*Distribution of Coal in the German Coalfields.\**

Coalfield.	Low-carbon Bituminous Coal.				Gas Coal.				Coking Coal.				Steam Coal.				Anthracite.			
	Car- bon. Per cent.	Hydro- gen. Per cent.	C/H ratio (Aver- age)	Oxy- gen. Per cent.	Car- bon. Per cent.	Hydro- gen. Per cent.	C/H ratio (Aver- age).	Oxy- gen. Per cent.	Car- bon. Per cent.	Hydro- gen. Per cent.	C/H ratio (Aver- age).	Oxy- gen. Per cent.	Car- bon. Per cent.	Hydro- gen. Per cent.	C/H ratio (Aver- age).	Car- bon. Per cent.	Hydro- gen. Per cent.	C/H ratio (Aver- age).		
Ruhr	79-82	6	16.1	82.86	16.7	13-10	16.7	86-90	5	10-5	17.6	90-93	5	5-3.5	22.3	93.97	3.5-1	61.8		
Aachen	...	...	21-13	5	15.6	82.86	5	13-10	5	8-5	17.7	90-93	5	5-3.5	22.3	93.94	3.5-3	29.0		
Saar	74-82	5	16.6	82.86	5	13-10	16.7	86-87	5	10-8	17.2									
Upper Silesia	74-82	5	21-13	5	16.6	82.86	5	13-10	16.7	86-88	5	10-7	17.3	10-5	17.5	90-91	5-4.5	20.2		
Lower	"	77-82	5	21-13	15.9	82.86	5	13-10	16.7	85-90	5	10-5								

\* Based upon a table in *Atlas Générale des Houillères*, by E. Gruner and G. Bousquet, Part 2 (text), 1911.

*Production of Coal in Germany.*

Year.	Quantity (long tons).		
	Coal.	Brown Coal.	Total.
1913 ... ... ...	188,433,296	85,831,124	274,264,420
1914 ... ... ...	158,939,122	82,348,570	241,287,692
1915 ... ... ...	144,354,473	86,534,848	230,889,321
1916 ... ... ...	155,939,887	92,666,393	248,606,280
1917 ... ... ...	164,622,073	94,017,327	258,639,400
1918 ... ... ...	157,928,405	99,050,121	256,978,526
1919 ... ... ...	106,839,884	92,320,050	199,159,934

NOTE.—The figures for the years 1913–1918 include the Alsace-Lorraine output. The figures for 1919 are exclusive of the Alsace-Lorraine and Saar districts.

*Production of Coal in Alsace-Lorraine.*

Year.	Quantity (long tons).		
	1913	1914	1915
1913 ... ... ...	3,734,926		
1914 ... ... ...	2,811,448		
1915 ... ... ...	1,929,452		
1916 ... ... ...	1,995,100		
1917 ... ... ...	2,594,620		
1918 ... ... ...	2,619,218		
1919 ... ... ...	2,469,661		

Included in the  
Coal Production  
of Germany.

*Imports and Exports of Coal into and from Germany.*

Year.	Quantity (long tons).					
	Imports.			Exports.		
	Coal.	Brown Coal.	Total.	Coal.	Brown Coal.	Total.
1913 ...	10,371,000	6,875,000	17,246,000	34,018,000	59,000	34,077,000
1914 ...	6,371,000	5,538,000	11,909,000	26,820,000	46,000	26,866,000
1915 ...	2,435,000	5,051,000	7,486,000	16,584,000	38,000	16,622,000
1916 ...	1,304,000	5,211,000	6,515,000	18,813,000	36,000	18,849,000
1917 ...	496,000	3,854,000	4,350,000	14,978,000	25,000	15,003,000
1918 ...	192,000	2,967,000	3,159,000	12,746,000	31,000	12,777,000
1919 ...	48,000	1,874,000	1,922,000	8,427,000	13,000	8,440,000

*Imports of Coal into Germany.*

From	Coal.		Brown Coal.	
	Quantity (long tons).		Quantity (long tons).	
	1913.	1919.	1913.	1919.
United Kingdom	...	...	9,061,533	—
Austria-Hungary	...	...	484,693	—
Belgium	...	...	310,210	—
Czechoslovakia	...	...	—	380
France	...	...	7,934	20
Netherlands	...	...	502,268	2,113
United States	...	...	—	45,487
Other Countries	...	...	3,987	—
Total from Foreign Countries.		1,309,092	48,000	6,874,395
TOTAL	...	10,370,625	48,000	6,874,395
				1,874,455

*Exports of Coal from Germany.*

To	Coal.		Brown Coal.	
	Quantity (long tons).		Quantity (long tons).	
	1913.	1919.	1913.	1919.
United Kingdom	...	...	10,886	—
Egypt	...	...	88,557	—
British India	...	...	42,895	—
Austria-Hungary	...	...	11,957,192	2,083,921*
Belgium	...	...	5,636,342	—
Denmark	...	...	216,180	339,882
France	...	...	3,190,068	—
Greece	...	...	61,674	—
Italy	...	...	878,120	—
Netherlands	...	...	7,101,609	1,143,014
Poland	...	...	—	159,798
Rumania	...	...	128,897	—
Russia	...	...	2,069,408	—
Spain	...	...	274,531	—
Sweden	...	...	174,801	65,413
Switzerland	...	...	1,612,408	176,600
Algeria	...	...	70,146	—
Other Countries	...	...	177,290	4,458,718
TOTAL	...	34,017,868†	8,427,346	59,375
				12,646

\* Territories comprising former Austria-Hungary.

† Including 326,864 tons of bunker coal.

*Analyses of German Coke.*

No.	Coalfield.	Moisture.	Ash.	Carbon.	Hydrogen.	Nitrogen.	Oxygen.	Volatile Matter.	Sulphur.	Phosphorus.	Calorific Value.	Pore-space.
Rhenish-Westphalia—												
1	Blast-furnace coke (average of 36 samples)	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.
2	Foundry coke (average of 26 samples)	9.19										
3	Westphalian Foundry Coke (average of 4 samples)	10.70	88.43									
4	Westphalian Coke (average of 3 samples)	9.11	8.14									
5	German Coke (average of 3 samples)	8.00	9.57									
6	Prussian Coke (average of 6 samples)	13.00	84.87	0.44	1.67	0.02						
7	Upper Silesian Coke, average Coke, average	8.82	83.72	1.24	1.43	4.79						
8	Upper Silesian (Waldenburg) Coke, average	10.16	80.03	0.96	1.30	7.55						
9	Upper Silesian Blast-furnace Coke, average											47.71
10	Upper Silesian Cube Coke, average											
11	Upper Silesian Nut Coke, average											

<sup>1, 2</sup> Stahl und Eisen, Vol. XXXVII, Journ. Iron and Steel Inst. (London), 1906, 4.  
<sup>3, 5, 9-11</sup> Stahl und Eisen, Vol. XXXIV, Journ. Iron and Steel Inst. (London), 1904, 2, 1905, 1.  
<sup>4, 6-8</sup> Oester. Zeits. für Berg- und Hüttenwesen, Vol. LII, Journ. Iron and Steel Inst. (London), 1904, 1.

*German Production, Imports and Exports of Coke.*

Year.	Quantity (long tons).		
	Production.	Imports.	Exports.
1913 ... ... ...	31,650,000	585,000	6,330,000
1914 ... ... ...	26,885,000	354,000	3,796,000
1915 ... ... ...	25,935,000	88,000	3,655,000
1916 ... ... ...	32,492,000	103,000	4,068,000
1917 ... ... ...	33,098,000	103,000	2,956,000
1918 ... ... ...	32,874,000	25,000	2,370,000
1919 ... ... ...	21,662,650		

*Production of Briquettes in Germany.*

Year.	Quantity (long tons).		
	Brown-Coal Briquettes.	Coal Briquettes.	Coal Briquettes.
1913 ... ... ...	21,048,000		
1914 ... ... ...	20,899,000	6,093,981	
1915 ... ... ...	21,694,000	6,477,131	
1916 ... ... ...	23,675,000		
1917 ... ... ...	21,695,000	5,466,349	
1918 ... ... ...	22,740,000		
1919 ... ... ...	19,124,000	3,938,515	

*Imports and Exports of Briquettes into and from Germany.*

Year.	Quantity (long tons).			
	Imports.		Exports.	
	Brown-Coal Briquettes.	Coal Briquettes.	Brown-Coal Briquettes.	Coal Briquettes.
1913 ... ... ...	119,000	27,000	847,000	2,266,000
1914 ... ... ...	129,000	21,000	792,000	1,877,000
1915 ... ... ...	145,000	74,000	514,000	1,192,000
1916 ... ... ...	128,000	52,000	494,000	1,622,000
1917 ... ... ...	93,000	7,000	347,000	790,000
1918 ... ... ...	55,000	5,000	239,000	611,000
1919 ... ... ...				

**Greece.\***

As a result of the war, Greece has acquired West Thrace from Bulgaria and East Thrace from Turkey.

\* Tableaux Statistiques du Mouvement Minier de la Grèce (Annual).

A superior quality of lignite has been discovered near Trikkala and Kalabaka, in Thessaly, but the deposit is of uncertain extent. Before the war, there was no great demand for lignite in Greece, which is in too southerly a latitude to need a considerable supply of domestic fuel, but during the war the demand increased. Such lignite as is used is generally mixed with British coal. There is said to be anthracite near Salonika.

The reserves of coal in Greece are estimated as follows\* :—

	Tons.
Actual reserve	... ... ... 10,000,000
Probable reserve	... ... ... 30,000,000

The coal generally is of inferior quality and is classified as lignite or brown coal. Important deposits of lignite are found at Koumi in Eubœa, also at Oropos, Aliveri and some other places. The coal is mined only at Koumi.

#### *Analyses of Greek Coals.†*

	Carbon.
(1) Oropos.	... ... ... 38·99
(2) Aliveri	... ... ... 40·24
(3) Koumi	... ... ... 44·04

#### *Production and Sales of Lignite in Greece.*

Year	Production.		Sales.	
	Quantity (long tons).		Quantity (long tons).	Value* (£).
1913	...	167	167	118
1914	...	19,681	18,277	12,637
1915	...	39,106	39,319	34,524
1916	...	115,069	107,470	174,424
1917	...	155,417	154,778	342,565
1918	...	210,057	201,827	610,704
1919	...	18,011	179,081	569,230

\* Values converted to £ sterling at the average rate of exchange for each year.

#### *Italy.‡*

By the Treaty of St. Germain, Italy acquired from Austria the Trentino (a part of Tyrol) and Trieste.

Anthracite, bituminous coal and lignite are all found in Italy, but 99 per cent. of the total coal production consists of lignite.

\* Coal Resources of the World, 1913, Vol. I, p. lxxxiv.

† Min. Journ. (London), Vol. LXXII, p. 83.

‡ Rivista del Servizio Minerario (Annual). Statistica del Commercio Speciale di Importazione e di Esportazione (Annual).

The estimated coal reserves in the known fields of Italy are as follows\* :—

—	Anthracite.	Lignite.	Total.
	Tons.	Tons.	Tons.
Actual Reserve ... ...	1,000,000	50,700,000	51,700,000
Probable " ... ...	143,000,000	48,750,000	191,750,000
<b>TOTAL</b> ... ...	<b>144,000,000</b>	<b>99,450,000</b>	<b>243,450,000</b>

The lignite obtained from Ribolla in the Commune of Roccastrada, province of Grosseto, Tuscany, is of the pitch type and may be used as a gas coal, its quality being similar to that of Scottish "splint."

Prior to the war, Great Britain furnished, normally, about nine-tenths of Italy's coal requirements, of which, it is estimated, the railways consumed about one-fourth in 1912.

In 1913, Italy was the second largest recipient of British coal exports, taking 9,246,107 tons of coal and coke†, an increase of nearly half a million tons compared with the previous year. More than half of the quantity came from South Wales. Two million tons consisted of small coal, used in the railway service, and there was also a heavy import of domestic coal. The Italian production of coal is relatively insignificant, the output (including lignite) for 1913 being about 700,000 tons, obtained from 40 mines.

In 1914, after the outbreak of war, Italy was faced with a serious fuel problem. The imports from Great Britain, for 1914, fell by about one million tons, to 8,348,753 tons, while those from Germany declined from 875,205 tons in 1912 to 824,000 tons in 1914.

In 1915, the imports from Great Britain were considerably curtailed, and amounted to only 6,589,400 tons.

Imports from the United States for 1915 amounted to 1,130,816 tons, as compared with practically nothing for previous years. In 1916, they fell to 1,039,758 tons.

In 1917, Italy produced 44,714 tons of anthracite (including 19,925 tons of Triassic coal), 19,433 tons of bituminous shale, and 1,630,333 tons of lignite; making a total of 1,694,480 tons. In 1918, the total production was 2,136,499 tons (including 2,083,119 tons of lignite). In 1919, the total production fell to 1,295,798 tons.

#### Production of Peat in Italy.

Year.		Quantity (long tons).	Value‡ (£).
1913 ...	...	23,329	10,351
1914 ...	...	32,770	12,785
1915 ...	...	49,383	18,766
1916 ...	...	66,466	49,744
1917 ...	...	175,391	316,432
1918 ...	...	273,619	545,301
1919 ...	...	99,279	220,280

\* Coal Resources of the World, 1913, Vol. I, p. lxxxiii.

† The trade figures for Italy relating to coal include those for coke.

‡ Values converted to £ sterling at the average rate of exchange for each year.

*Analyses of Italian Coals.*

No.	Coalfield.	Proximate Analysis.				Ultimate Analysis.				Calorific Value. Cals.
		Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Carbon.	Hydrogen.	Oxygen and Nitrogen.		
<i>Anthracite.</i>										
1	Valle d'Aosta :— Osiglia ...	... 5.76	72.46	2.80	18.98	—	—	—	5,880	
2	Morgex ...	... 5.70	59.32	2.35	32.63	—	—	—	4,830	
3	Thonie ...	... 5.98	71.38	3.39	19.25	—	—	—	5,780	
4	Gourmayeur ...	... 12.39	48.71	3.32	35.58	—	—	—	3,950	
5	La Salle and St. Rheney ...	... 7.48	47.38	2.29	42.85	—	—	—	3,850	
<i>Valle della Bornida :—</i>										
6	Bormida ...	... 5.96	52.65	2.28	39.11	—	—	—	4,275	
7	Calizzano ...	... 5.32	78.38	2.64	13.66	—	—	—	6,410	
<i>Brown Coal.</i>										
8	Palli (Vicenza) ...	... ...	...	...	35 to 45	48 to 55	5 to 14	—	—	
9	Vallée de la Bruna (Grosseto) ...	...	...	...	...	...	...	5.32	3,800 to 4,500	
<i>Lignite.</i>										
10	Valdarno (Arezzo) ...	... 40.50	23.50	31.60	4.40	55.37	5.66	32.98	4,200 to 5,400	
11	Spoletto (Perugia) ...	... 36.00	...	...	9 to 10	—	—	—	2,565	

12	<i>Bituminous Schist.</i> Respiutta (Udine)	...	...	...	14·20	47·47	38·33
SARDINIA.							
13	<i>Anthracite.</i>	...	...	...	...	...	...
14	Lareni	...	...	...	...	...	...
"	"	...	...	...	...	...	...
15	<i>Brown Coal.</i>	...	...	...	...	...	...
16	Piolanas	...	...	...	...	...	...
17	Sass' Orruda	...	...	...	...	...	...
	Bacu Abis ...	...	...	...	...	...	...
18	<i>Bituminous Schist.</i> Sass' Orruda	...	...	...	...	...	...

1-11, 15.—Coal Resources of the World, 1913, Vol. II.  
 12.—Resulta cenni su quello schistio bituminoso, by G. Smerzi, 1901.  
 13, 14, 16-18.—Rivista del Servizio Minerario, 1917, 1918.

*Production of Coal in Italy.*

Year.	Quantity (long tons).				Value* (£).			
	Anthra-cite.†	Lignite.	Bitumi-nous Schist.‡	Total.	Anthra-cite.†	Lignite.	Bitumi-nous Schist.‡	Total.
1913 ...	1,102	686,112	2,598	689,812	898	264,648	1,006	266,552
1914 ...	1,417	765,799	1,515	768,731	1,352	309,205	576	311,133
1915 ...	9,164	923,985	4,665	937,764	10,757	726,483	3,456	740,696
1916 ...	18,246	1,262,202	4,405	1,284,853	52,894	1,757,579	5,371	1,816,844
1917 ...	44,714	1,650,333	19,433	1,694,480	146,900	2,162,445	32,660	2,342,006
1918 ...	31,812	2,083,119	21,568	2,136,499	171,029	3,289,199	36,175	3,496,403
1919 ...	23,300	1,261,996	10,393	1,295,758	166,702	2,183,750	17,613	2,368,068

\* Values converted to £ sterling at the average rate of exchange for each year.

† Including 'Carbone triassico':—1915, 10 tons (£14); 1916, 2,771 tons (£6,294); 1917, 19,925 tons (£42,596); 1919, 1,377 tons (£6,442).

‡ Including 'Schisto carbonoso':—1918, 394 tons (£433); 1919, 216 tons (£225).

§ Including 69 tons of 'Carbone liasico' produced in Trento, the value of which is not stated.

|| Excluding value of 70,756 tons produced in Trento and Dalmatia.

*Exports of Coal from Italy.*

Year.	Quantity (long tons).			Value* (£).	
	1913	1914	1915	1916	1917
1913 ...	...	...	...	188,916	262,651
1914 ...	...	...	...	51,774	75,112
1915 ...	...	...	...	77,819	94,653
1916 ...	...	...	...	92,803	536,040
1917 ...	...	...	...	76,188	411,297
1918 ...	...	...	...	58,206	400,034
1919 ...	...	...	...	82,313	513,233

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Coal and Coke into Italy.*

From.	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom ...	9,246,107	8,348,753	6,589,405	6,884,756	4,489,966	4,204,216	4,614,415
Austria-Hungary ...	131,825	65,406	12,535	—	—	—	—
Belgium ...	4,288	2,172	1,301	—	—	—	69,567
France ...	162,027	66,198	23,197	3,965	19,317	1,492,626	216,611
Germany ...	952,220	823,535	478,436	—	—	—	43,516
Netherlands ...	71,398	1,342	1,038	—	—	—	—
United States ...	92,025	286,957	1,180,817	1,039,758	443,816	45,233	1,140,621
Other Countries ...	—	7,680	5,618	6,945	3,438	4,975	9,046
Total ...	10,659,890	9,602,038	8,242,347	7,935,424	4,956,537	5,747,050†	6,093,776‡
Total Value £* ...	14,820,510	13,349,772	10,038,406	45,835,801	26,757,742	39,497,714	37,535,650

\* Values converted to £ sterling at the average rate of exchange for each year.

† This total is made up as follows:—

	Long Tons.
" Litantrace " (Bituminous coal)	... ... ... ... ... ... 4,850,776
Anthracite ... ... ... ... ... ...	397,287
" Mattonelle " (Coal briquettes) ...	... ... ... ... ... ... 89,192
Lignite ... ... ... ... ... ...	5,698
Metallurgical Coke ... ... ... ... ... ...	125,166
Gas coke ... ... ... ... ... ...	88,230
" Agglomerate " (Lignite and other briquettes)	... ... ... ... ... ... 24,258
Peat ... ... ... ... ... ...	454
Other kinds of Fuel ... ... ... ... ... ...	165,989

TOTAL ... ... ... ... ... ... 5,747,050

This detailed information is not given for other years.

‡ In addition, under terms of Peace Treaty, 32,607 tons of coal from Germany were received into Italy.

*Production of Coke in Italy.*

Year.	Quantity (long tons).			Value* (£).		
	Gas Coke.	Metal-lurgical Coke.	Total.	Gas Coke.	Metal-lurgical Coke.	Total.
1913 ...	824,473	490,431	1,314,904	1,340,342	794,627	2,134,969
1914 ...	810,044	445,762	1,255,806	1,452,120	725,771	2,177,891
1915 ...	803,268	441,509	1,244,777	2,292,670	1,879,631	4,172,301
1916 ...	†	507,275	507,275	†	3,500,656	3,500,656
1917 ...	†	440,197	440,197	†	5,628,296	5,628,296
1918 ...	†	365,436	365,436	†	5,562,874	5,562,874
1919 ...	†	297,872	297,872	†	2,959,766	2,959,766

\* Values converted to £ sterling at the average rate of exchange for each year.

† Not stated.

*Production of Tar at Gas Works and Metallurgical Works in Italy.*

Year.	Quantity. (long tons).	Value* (£).
1913 ...	... 80,570	116,735
1914 ...	... 84,919	125,252
1915 ...	... 87,240	155,280
1916 ...	... 36,029†	119,902
1917 ...	... †	†
1918 ...	... 8,270	34,387
1919 ...	... 8,234	32,086

\* Values converted to £ sterling at the average rate of exchange for each year.

† Does not include tar made at coke works, regarding which no information is given.

‡ Not stated.

**Montenegro.**

Montenegro became part of Jugoslavia on November 26th, 1919.

Bituminous coal occurs to the east of Nikchitche, in the central part of Montenegro, in the valley of the Lim River, and near the Albanian frontier within a short distance of Podgoritza, as well as in scattered patches near Cettinje and in other parts of the country.

The coal deposit near Nikchitche is believed to cover perhaps a hundred square miles and to contain coal of fair quality in seams of workable thicknesses. On the Albanian frontier a seam of coal  $6\frac{1}{2}$  feet thick is reported to occur in an area which might be connected by means of a short line of railway with the most thickly settled part of the country, in the vicinity of Podgoritza and Lake Scutari.

Lignite has been found in the district of Velestovo, situated about 25 miles to the north of Cettinje.

### Netherlands.

\**Peat*.—Peat occurs in nearly all the provinces of the Netherlands, the largest deposits being situated in the province of Drenthe. The production, which in 1912 was about 193,623 tons, has increased by 50 per cent., and corresponds with about one-fifth of the country's fuel requirements.

*Coal*.—The proved coalfields of the Netherlands are† :—

- (1) The coalfield of South Limburg, which has been proved to be workable over an area of about 88 square miles, in the region of the townships of Kerkrade, Heerlen, Schinnen, Geleen and Sittard; 25 square miles, in addition, may contain workable coal. This area is a direct continuation of the Campine coalfield of Belgium from the west, and the Worm basin (Aix-la-Chapelle) of Germany to the east.
- (2) The coalfield of southern Peel, in North Limburg, extending into the province of North Brabant. An area of about 65 square miles may be considered as workable, while a further 40 square miles may be regarded as a possible extension, where greater depth or a smaller number of workable seams make mining questionable.

The Government has reserved an area of 65,600 acres in the South Limburg coalfield. Production began in 1901 at the Emma Mine, which yielded 616,182 tons in 1919. The Wilhelmina Mine began to produce coal in 1910, and yielded 539,546 tons in 1919. The Hendrik Mine began to produce in 1915, and yielded 296,841 tons in 1919. The Government proposes to continue the development so as to produce, in all, two million tons annually by 1925, three and a half million tons by 1936 and six million tons by 1950.

About one-fourth of the miners are foreigners, the proportion having increased during the war by the employment of Belgian refugees and German and Austrian deserters.

The total coal imports into the Netherlands during 1913 amounted to 13,492,147 tons, an increase of nearly a million and a half tons compared with 1912. Exports also showed an increase from a little over four and one-half million tons in 1912 to 5,024,222 tons in 1913.

In 1914 the imports fell to 11,100,468 tons, Germany contributing 9,249,572 tons, Great Britain 1,688,510 tons, and Belgium 157,214. The imports from Germany for the

\* Mining Journal (London), 1920, Vol. CXXIX, p. 403.

† The Coal Resources of the World, 1913, Vol. III, p. 783. Jaarverslag van den Hoofdingenieur der Mijnen.

year showed a decrease of 2,003,279 tons, while those from Great Britain and Belgium were less by 282,387 tons and 108,232 tons respectively. The diminution of imports was, however, largely counterbalanced by a reduction of 1,337,932 tons in the exports, most of which went to Germany, and the remainder to Belgium and France.

In 1915 some experimental cargoes were shipped from the United States, which, it is estimated, were delivered at a price of 50s. a ton, as compared with about 33s. 4d. a ton for British and German coal, which in normal times cost about 16s. 8d. a ton. The question was one of getting supplies rather than of price, Germany having passed a regulation restricting exports by one-third. The largest production in 1915 was from the Wilhelmina Colliery, a State mine with an output of 450,000 tons. The consumption for the year amounted to under 9 million tons, compared with 10 $\frac{1}{2}$  million tons in 1913.

The imports of coal in 1915 were 7 million tons, as compared with 11 million tons in 1914 and 13 $\frac{1}{2}$  million tons in 1913. This decline in imports was, however, again largely counterbalanced by a corresponding decline in exports.

The exports fell from 5 million tons in 1913 to 3 $\frac{3}{4}$  million tons in 1914, and to only a quarter of a million tons in 1915.

*Brown Coal.*—Brown coal does not appear to have been produced in the Netherlands in commercial quantities prior to 1917, although it was known to exist in the area now being worked. The workings are shallow and the area of the district is small.

#### *Production of Peat in the Netherlands.*

Fiscal years ending March 31.

						Quantity. (long tons.)
1917	...	...	...	...	...	394,000
1918	...	...	...	...	...	443,000
1919	...	...	...	...	...	640,000

The coal reserves of the Netherlands, comprising the South Limburg and the Southern Peel areas, are estimated to be as follows\* :—

		Tons.
Actual Reserves	...	209,071,000
Probable Reserves	...	1,846,200,000
Possible Reserves	...	2,347,580,000
		<hr/>
TOTAL	...	4,402,851,000

\* Coal Resources of the World, 1913, Vol. I, p. lxxxvii.

*Production of Coal in the Netherlands.*

Year.	Coal.		Brown Coal.		Total.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ...	1,842,976	1,192,146	—	—	1,842,976	1,192,146
1914 ...	1,897,546	1,194,969	—	—	1,897,546	1,194,969
1915 ...	2,225,792	1,800,008	—	—	2,225,792	1,800,008
1916 ...	2,613,400	2,680,622	—	—	2,613,400	2,680,622
1917 ...	2,959,583†	3,819,802	41,760	44,243	3,001,343	3,864,045
1918 ...	3,344,877‡	6,011,074	1,459,175	1,558,190	4,804,052	7,569,264
1919 ...	3,346,878§	6,286,271	1,851,716	1,672,751	5,198,594	7,959,022

\* Values converted to £ sterling at the average rate of exchange for each year.

† Exclusive of 116,189 tons of slack.

‡ 146,541 tons of slack.

§ 136,292 tons of slack.

*Imports and Exports of Coal into and from the Netherlands.*

Year.	Imports (long tons).	Exports (long tons).
1913 ...	13,492,147	5,024,222
1914 ...	11,100,468	3,686,290
1915 ...	6,851,036	269,564
1916 ...	5,588,622	80,838
1917 ...	2,617,403	57,104
1918 ...	1,288,800	111,929
1919 ...	2,909,665	105,710

Note.—The above figures are not of much value, as it is impossible to distinguish, in Dutch Reports, between true exports and imports and coal carried through the Netherlands.

*Production of Briquettes in the Netherlands.*

Year.	Egg Briquettes (long tons).	Block Briquettes (long tons).	Total (long tons)
1916 ...	114,487	173,315	287,802
1917 ...	163,244	218,400	381,644
1918 ...	184,782	311,302	496,084
1919 ...	277,948	297,080	575,028

*Norway.\**

The only locality in Norway where coal occurs is the island of Andö, in the northernmost part of the country, where, exposed on the seashore, there is a seam of cannel coal. In its better

\* Statistisk Aarbok for Kongeriket Norge, 1920.

parts, the seam has a thickness of about 3 feet, and the mean of several analyses shows about 25 per cent. of fixed carbon, 49 per cent of volatile matter, with not less than about 26 per cent. of ash.

*Imports of Coal and Coke into Norway.*

Year.		Coal (long tons).	Coke and Cinders (long tons).
1913	...	2,240,216	202,311
1914	...	2,464,349	255,191
1915	...	2,714,174	331,031
1916	...	2,427,895	359,335
1917	...	1,042,438	164,333
1918	...	1,398,693	149,899
1919	...	1,569,468	193,186

**Spitzbergen (Norway).**

Coal is found in the Permo-Carboniferous, Jurassic and Tertiary formations of West Spitzbergen, but, so far as is known at present, the Tertiary coal is the best. There appears to be a difference of opinion among authorities as to the age of the so-called Tertiary coal-bearing strata, particularly in the region of Lowe Sound, where they are regarded as being possibly of Upper Cretaceous age.

Carboniferous coal occurs mainly in the heart of West Spitzbergen, at the head of Icefjord, where it is seen at the surface in Klaas Billen Bay. In Icefjord the main Carboniferous seam is about 6 feet in thickness, but the coal is shaly and not of good quality. Carboniferous coal of low value is found in the north-western portion of Bear Island (situate about half-way between Spitzbergen and Norway).

The Jurassic coal probably covers a larger area than the Carboniferous coal, but it is not, as a rule, so accessible. In Advent Bay the coal seam is about 4 feet thick. The coal is of poor quality and the beds are much faulted.

The Tertiary coal of Spitzbergen is considered to be the most valuable, and is described as a good steam coal containing only a small percentage of ash. In Advent Bay, on the south side of Icefjord, the seam varies from  $2\frac{1}{2}$  to 10 feet in thickness, and the medium thickness is given as 4 feet. The coal is being worked at British mines on Lowe Sound and at various mines on Icefjord, including Norwegian mines in Advent Bay and Green Harbour, a Swedish mine in Braganza Bay and a Russian mine.

The following are reported to be average analyses of Spitzbergen coal\* :—

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\* Spitzbergen, by R. N. R. Brown, London, 1920, p. 220.

	Carboniferous.	Jurassic.	Tertiary.
	Per cent.	Per cent.	Per cent.
Carbon ... ... ...	75·7	76·0	81·5
Hydrogen ... ... ...	4·6	6·0	3·7
Oxygen and Nitrogen ...	9·2	9·0	11·6
Sulphur ... ... ...	0·5	1·5	0·7
Ash ... ... ...	10·0	7·5	2·5
Total ... ... ...	100·0	100·0	100·0
Calorific value (calories) ...	7,500	7,375	7,700

Although situated in the Arctic region ( $76^{\circ} 20'$ — $85^{\circ} 50'$  N.), Spitzbergen is accessible for at least two months in the year. Normally, the shipping season is from the middle of June to the middle of October. It is stated, however, that the period could be extended in autumn by a month if a few lighthouses were erected, and that several bays could be entered much earlier in the season with the aid of ice-breakers. On the other hand, continuous daylight during the summer months renders it possible to load a vessel immediately on its arrival; and, given sufficient labour, shifts could be worked throughout the twenty-four hours. During the winter season coal can be mined and stacked.

\*In this connection, it may be mentioned that in 1920, owing to the fact that little ice was observed, arrangements were made to extend the period for shipping beyond September 18th, which is the more usual limit, and the last ship left Spitzbergen on October 12th. Considerable quantities of coal were shipped during the summer:—34,000 tons from King's Bay, 35,000 tons by the Swedish firm in Braganza Bay and 11,000 tons by the Russian Company in Green Harbour—in all, about 80,000 tons. The Store Norske Company has had a poor year and exported little, due partly to trouble with their men, but chiefly to the fact that they were engaged in building new plant rather than in actual mining. The Company proposes to have 150 men working on their property during the winter. Among the various companies operating on Spitzbergen, about 1,000 men were expected to be employed during the winter. The labour situation is stated to have improved considerably, and no fresh labour troubles are expected for the present.

It is difficult to obtain accurate returns of the quantities of coal exported from Spitzbergen, but the following figures may be taken as being approximately correct:—

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\* Acting British Consul, Bergen; Board of Trade Journal, December 2nd, 1920, p. 667.

Year.	Quantity (long tons).	Year.	Quantity (long tons).
1909 ... ... ...	15,000	1915 ... ... ...	28,000
1910 ... ... ...	20,000	1916 ... ... ...	20,000
1911 ... ... ...	25,000	1917 ... ... ...	40,000
1912 ... ... ...	40,000	1918 ... ... ...	60,000
1913 ... ... ...	35,000	1919 (estimated) ...	80,000
1914 ... ... ...	40,000		

The following are the approximate distances from various ports to Spitzbergen :—

Nautical miles.

Aberdeen to Icefjord ...	...	...	1,300
London to Icefjord ...	...	...	1,750
Bergen to Icefjord ...	...	...	1,150
Trömsö to Icefjord ...	...	...	520
Trömsö to Bell Sound	...	...	490
Murmansk to Icefjord	...	...	650

### *Analyses of Spitzbergen Coal.*

	Ultimate Analysis.						Calorific Value.	Coke.
	Mois-ture.	Carbon.	Hydro-gen.	Oxygen and Nitro-ge-n.	Sul-phur.	Ash.		
1 Advent Bay ...	Per cent. 3·46	Per cent. 77·26	Per cent. 5·20	Per cent. 10·87	Per cent. 1·51	Per cent. 1·70	Cals. 7,311	Per cent. 62·26
2 Sassen Bay ...	1·86	76·15	5·45	8·51	0·85	7·18		
3 Spitzbergen Coals	1·99	79·79	5·45	9·49	0·76	2·52	7,703	

	Proximate Analysis.				
	Hygros. Water.	Fixed Carbon.	Volatile Matter.	Sulphur.	Ash.
4 Advent Bay (Upper Juras-sic) (Top Coal)	Per cent. 3·81	Per cent. 62·76	Per cent. 19·79	Per cent. 0·47	Per cent. 13·67 (grey).
5 Advent Bay (Upper Juras-sic) (Bottom Coal)	4·70	57·17	28·56	0·41	9·16 (light brown).

1-2. *Annales des Mines* (Paris), 1914, Series XI., Vol. V, pp. 125-197, R. Berr; Journal of the Iron and Steel Inst. (London), 1914, Pt. I, p. 599.

3. *Chemical News* (London), Vol. CV, p. 277, W. H. Patterson.

4-5. The Jurassic Coal of Spitzbergen, by J. J. Stevenson; *Annals of the New York Academy of Sciences*, 1905, Vol. XVI, pp. 82 to 95; *Trans. Inst. Min. Eng.* (London), Vol. XXIX (1904-5), p. 683.

### **Portugal.\***

† Coal is found both in the northern and southern parts of Portugal. In the north, coal of Upper Carboniferous age occurs

\* *Boletim de Minas. Boletim Comercial e Marítimo.*

† *Coal Resources of the World*, 1913, Vol. II, pp. 639-641.

in the vicinity of San Pedro da Cova. The coal has become anthracitic owing to the intrusions of diorite which in places have passed through the coal-seams. No borings have been made to determine to what depth the Carboniferous strata extend.

The coal area in the south is of Upper Jurassic age, and is situated at Cabo Mondego, near Figueira da Foz, in the Coimbra district. No borings have been made to determine the depth that the coal-seams reach, but they are known to extend to a depth of 1,000 feet from the surface.

#### *Analyses of Portuguese Coals.*

No.	District.	Ultimate Analysis.			Calorific Value.
		Carbon.	Hydrogen.	Oxygen and Nitrogen.	
1	Douro (Anthracite)	Per cent. 75 to 79	Per cent. 1·5	Per cent. 3·5	Cals. 6,600-7,800
2	Cabo Mondego (Bituminous Coal)	65 to 78	5 to 7	5 to 6	6,600-7,800

1-2. Coal Resources of the World, 1913, Vol. II, pp. 641-2.

#### *Portuguese Production, Imports and Exports of Coal.*

Year.	Production.	Imports.		Exports.	
		Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ...	24,635†	1,330,094	1,236,566	10,935	10,781
1914 ...	29,203†	1,158,479	1,095,826	10,836	10,688
1915 ...	59,279	1,036,277	1,296,848	140	316
1916 ...		924,586	3,010,027	104,984	403,438
1917 ...		389,639	2,251,990	169,797	1,085,387
1918 ...		207,732	1,834,954	148,407	902,765
1919 ...		606,297	2,886,962	160,143	1,212,883

\* Values converted to £ sterling at the average rate of exchange for each year.

† Anthracite produced and consumed in the country.

#### *Rumania.\**

At the end of the Balkan War, 1912-13, Rumania secured an adjustment of her south-eastern (Dobruja) frontier at the expense of Bulgaria, and as a result of the recent war more

\* Coal Resources of the World, 1913, Vols. I and III.

than doubled her territory by the acquisition of Bessarabia (from Russia), Bukovina (from Austria), and Transylvania and part of the Banat of Temesvar (from Hungary).

Anthracite, bituminous coal and lignite all occur in Rumania. Anthracite is worked on a small scale at Schela in the province of Gorj. Lignite is found in many parts, and the seams sometimes reach a thickness of 20 feet. It is mined in the following provinces : Mehedintzi, Muscel, Dambovitz, Prahova, Rimnicu-Sarat, Buzau, Pirtna, Gorj and Bacau. A fuel of excellent quality is produced by converting lignite into briquettes with the addition of petroleum residues. The mines at Margineanca, in the province of Dambovitz, are worked by concession from the State.

Before the war, Rumania imported 300,000 tons of coal and coke from England, Germany and Turkey, her own fuel production consisting almost entirely of lignite.

\* The lignite deposits are found over a fairly large area, containing an estimated reserve of about 200 million tons,  $2\frac{1}{2}$  million tons being already in sight. Fifty concessions, covering an area of 600 square miles, have already been granted. The principal lignite centres are the Comanesti basin in the Balkans, producing about 35,000 tons per annum, and the Muscel and Dambovitz districts with an annual production of 200,000 tons of inferior quality.

In 1909-10, 65 per cent. of the lignite consumed by the Rumanian railways was obtained from the mines of Margineanca, Sotanga and Aninoasa (Jalomitza basin), 29 per cent. from the mines of Jidava Poenari and Schitu-Golesti (Muscel district), and 6 per cent. from the mines in the Comanesti basin (Bacau district), Valea Copcei and Strehaja (Mehedintzi district), and Filipesti-de-Padure (Prahova district). The total consumption of fuel was : lignite 10,269 tons, coal 32,112 tons and petroleum residue 136,435 tons.

Prior to the war, there was an important trade to the port of Braila, on the Danube, coal from the mines of the Muscel district being sent by water from Schitu-Golesti to Braila, a distance of  $227\frac{1}{2}$  miles, the price per ton being 7s. 9d. on barge and 16s. 9d. delivered at Braila. The output of the Dambovitz mines was barged from Doicesti,  $193\frac{1}{2}$  miles from Braila, the price being 7s. 9d. on barge and 15s. 3d. at Braila, and that of the Baian district at Asau,  $142\frac{1}{2}$  miles from Braila, the price being 13s. 0d. on barge and 18s. 6d. at Braila. The total production of coal for the whole country increased from 62,310 tons of the value of £19,158 (6s. 2d. per ton) in 1900-01 to 238,130 tons of the value of £108,131 (9s. 1d. per ton) in 1911-1912. The actual reserve of lignite is estimated to amount to  $2\frac{1}{2}$  million tons, with a probable reserve of 36 million tons.

*Analyses of Rumanian Coals and Lignites.*

No.	District.	Locality.	Proximate Analysis.					Calo- rific value.
			Mois- ture (hygro- scopic).	Fixed carbon.	Volatile matter.	Ash.	Sulphur (vola- tile).	
1	Gorj ...	Schela (Anthracite) ...	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Cals.
2	Mehedintzi	Bahna (Lignite) ...	6·23	88·87	3·84	1·56	0·33	4,517
3	Bacau ...	Comanesti Asau-	10·21	37·56	41·71	10·52		5,587
		Vermesti (Lignite)	12·46	40·04	39·46	8·04	1·36	
4	Mehedintzi	Valea Copcei (Lignite) ...	32·07	17·61	37·84	12·48	1·59	3,607
5	Muscel ...	Schitu Golesti, Poenari, Berevoesti (Lignite)	22·22	27·60	42·48	7·70	0·67	4,348
6	Dambovitza	Margineaanca-Fagetel (Lignite)	25·72	15·55	45·73	18·00	0·95	3,872
7		Sotanga-Aminoasa, Vul- cana-Pandele (Lignite)	22·34	30·20	35·57	11·89	1·91	4,213
8	Prahova ...	Filipesti-de-Padure (Lignite)	15·77	39·86	33·13	11·24		3,802
9	Buzau ...	Coca-Scheia (Lignite) ...	16·06	36·35	40·44	7·15	1·17	5,143
10		Average for various fields—	From	4·48	55·79	6·25		
			To	19·61	72·49	15·70		
11	Bacau ...	Trotus Valley ...	12·67	64·90	5·49	6·25	1·59	

1-9. Coal Resources of the World, 1913, Vol. III.

10. J. Tanasesco, Moniteur des Intérêts Pétrolieres Roumains, Vol. II, p. 1105.

11. V. Isco, Moniteur des Intérêts Pétrolieres Roumains, Vol. III, pp. 859-864.

**Russia (in Europe).**

The principal territorial changes in European Russia, brought about directly or indirectly by the recent war, are, briefly, the separation of the following republics:—Finland, Poland, Esthonia, Latvia (Lettland), Lithuania, Ukraine, Don, Kuban, Tartar Bashkir, Taurida, Terek, North Russia and East Karelia. Also, Bessarabia has been ceded to Rumania.

**Peat.**—Peat is abundant in Russia, and it deserves special attention, as it can be easily and economically obtained in localities far removed from railways. Many of the “turbaries” have been carefully tested by boring, and large areas of peat-bog have been proved, several of them ranging from 19 to upwards of 38 square miles in area and occupying, in the aggregate, a total area of at least 398 square miles. There are large peat works in the neighbourhood of Petrograd, and the Rojsjo Peat Works are manufacturing compressed peat in Finland.

\*Esthonia (excluding that part of Northern Latvia, which now belongs to the Esthonian Republic) possesses a total area of 648,000 acres of peat moors. The deposits vary from  $6\frac{1}{2}$  to  $19\frac{1}{2}$  feet in thickness, and there is a total estimated reserve of at least 200 million tons. The calorific value of the peat is put at 2,700 calories.

**Coal.**—The coalfields of Russia-in-Europe may be divided into six areas:—(1) The central part of European Russia (the Moscow basin); (2) the Dombrova basin (Province of Kielce, Poland); (3) The Donetz basin (Ukraine); (4) the brown coals of the south-

west part of European Russia ; (5) the coals of the west slope of the Urals ; and (6) the coals of the Caucasus and Trans-Caucasus.

Coal (anthracite, bituminous coal and lignite) mines are in operation in the districts of Donetsk, Poland, Moscow, Ural, Kieff and the Caucasus.

The Donetsk basin, situated in the Ukraine,\* is by far the most productive coal area in Russia.

+The coal is in one large field, which extends from west to east for a distance of 300 miles. It is considered the largest coal-field in Europe, but it is split up into several areas, with varying qualities of coal. Roughly, the flaming coals are at the western end of the field, the coking and semi-anthracitic coals in the centre and the anthracite in the east, though coking coals are also found towards the north-east corner. Throughout the field the seams vary much in thickness, the average of those worked being from 21 to 35 inches ; but seams of 5 feet are moderately common, and the maximum thickness is 7 feet.

‡Next in importance is the Dombrova coal-basin, which forms the north-eastern end of the Upper Silesian basin, and is situated in the districts of Bendin (Petrokov Government) and Olkutz (Kyeltsi Government). The entire district in which productive coal-deposits are believed to occur covers about 320 square miles. The coals occur in a thick series of Carboniferous measures, and the seams are very numerous and, in places, are of great thickness. The coal of the upper seams, in respect of quality, is inferior, being friable and containing a large quantity of ash, while that of the lower seams is a good, non-coking "dry" coal. In the northern part of the basin there are thick beds of brown coal which are somewhat extensively mined.

In 1913 the total production of coal in European Russia amounted to 32,861,000 tons ; that of the Ural district increasing to 1,026,000 tons, compared with 764,000 tons in 1912, in consequence of the conversion of the locomotives on the local railway so as to burn coal instead of wood. Imports of coal into Russia experienced a sharp advance from a little over five million tons in 1912 to nearly nine million tons in 1913, and coke imports, also, increased from 753,000 tons to 954,000 tons.

In 1914 the total production amounted to about 32,401,000 tons, this figure including five million tons of anthracite. One hundred and eighty-one thousand men were engaged in the coal industry, compared with 168,000 in 1913. The number fell very considerably during August, but again increased in November, and reached a total of 208,000 in December. The production from the Donetsk basin amounted to 26,951,000 tons as compared with 24,774,000 in 1913.

Russia supplied Finland with 537,000 tons of coal, compared with 488,000 tons in 1912, practically all of which was obtained from Great Britain.

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\* The Ukraine is a district of Southern Russia consisting of the former governments of Tchernikov, Kharkov, Kiev, Poltava, Ekaterinoslav, Kherson, Podolia and Volhynia.

+ Foreign Office Handbook, No. 52.

‡ Coal Resources of the World, 1913; Vol. III, p. 1152.

In 1915 the production in European Russia amounted to about 32,316,000 tons, of which the Donetz coalfield produced 27,565,000 tons. In this year the Dombrova district fell completely into German hands and produced only 2,952,000 tons, none of which was available for Russia. The failure of production from this district, together with the cessation of imports, restricted the amount of coal available for the market by over 15 million tons, though this was partly compensated by a reduction in the consumption of 8,036,000 tons, owing to the German occupation of Poland and the Baltic Provinces, and by an increase in the amount of fuel-oil available, equivalent to several hundred thousand tons of coal. The coal imports amounted to only 80,360 tons, as compared with 5,416,000 tons in 1914 and 8,807,000 tons in 1913.

For the 12 months ending July, 1916, the production of coal in the south of Russia nearly reached the highest point attained before the war, but the imports were very much smaller, with the result that the stocks at the collieries and distributing centres became very low. The output of coal from the Donetz coalfield continued to increase up to April, 1917, and then fell suddenly. During the recent civil war the coalfield came within the zone of hostilities, and changed hands five times, the last change being in December, 1919, when the Red Army recaptured it.

\*The following table shows the various changes which took place in the output from the Donetz coalfield during the period under review :—

	Average per month during :—	Tons.
Last period before the war.	$\left\{ \begin{array}{l} 1\text{st half-year, } 1913 \\ 2\text{nd } , , 1913 \\ 1\text{st } , , 1914 \\ 2\text{nd } , , 1914 \end{array} \right.$	$\begin{array}{lll} \dots & 2,030,000 \\ \dots & 2,120,000 \\ \dots & 2,350,000 \\ \dots & 2,250,000 \end{array}$
Period of war until the revolution.	$\left\{ \begin{array}{l} 1\text{st } , , 1915 \\ 2\text{nd } , , 1915 \\ 1\text{st } , , 1916 \\ 2\text{nd } , , 1916 \\ 1\text{st quarter, } 1917 \end{array} \right.$	$\begin{array}{lll} \dots & 2,180,000 \\ \dots & 2,260,000 \\ \dots & 2,230,000 \\ \dots & 2,440,000 \\ \dots & 2,450,000 \end{array}$
First invasion of the Bolsheviks.	$\left\{ \begin{array}{l} \text{March, } 1917 \\ \text{November, } 1917 \end{array} \right.$	$\begin{array}{lll} \dots & 2,500,000 \\ \dots & 1,870,000 \end{array}$
Under rule of Hetman and German.	$\left\{ \begin{array}{l} \text{May, } 1918 \\ \text{May, } 1918 \\ \text{October, } 1918 \end{array} \right.$	$\begin{array}{lll} \dots & 440,000 \\ \dots & 440,000 \\ \dots & 800,000 \end{array}$
The Directory of Petlura.	$\left\{ \begin{array}{l} \text{November, } 1918 \\ \text{December, } 1918 \end{array} \right.$	$\begin{array}{lll} \dots & 770,000 \\ \dots & 720,000 \end{array}$
Second invasion of the Bolsheviks.	$\left\{ \begin{array}{l} \text{December, } 1918 \\ \text{June, } 1919 \end{array} \right.$	$\begin{array}{lll} \dots & 720,000 \\ \dots & 240,000 \end{array}$
Under rule of the Volunteer Army.	$\left\{ \begin{array}{l} \text{July, } 1919 \\ \text{August, } 1919 \\ \text{September, } 1919 \\ \text{October, } 1919 \end{array} \right.$	$\begin{array}{lll} \dots & 280,000 \\ \dots & 330,000 \\ \dots & 400,000 \\ \dots & 490,000 \end{array}$

\* The Iron and Coal Trades Review (London), Dec. 12th, 1919, p. 770.

*Exports of Coal.*—\*Before the war exports of coal from South Russia (Donetz district) were more or less accidental, reaching their maximum in 1912, when 160,000 tons of bituminous coal were exported from the port of Mariupol, chiefly to Turkey, Rumania and Bulgaria, and about 1,000 tons of anthracite were sent to Italy as an experiment. The closing of the Bosphorus and the Dardanelles in October, 1914, stopped further exportation.

*Coke.*—In the Donetz district there are, partly at the mines and partly at the larger ironworks, 6,527 coke ovens, with a producing capacity of over 5,000,000 tons per year, but they have never reached such a production. In 1919, most of the ovens were idle and the quite insignificant production of about 4,000 tons per month was used, almost exclusively, by the iron and steel works.

#### *Production of Peat in Russia.*

Year.	Quantity (long tons).		
	Central Region.	Ural.	
1913 ...	...	...	
1914 ...	...	...	
1915 ...	...	1,355,000	121,000
1916 ...	...	1,339,000	
1917 ...	...	1,145,000	137,000
1918 ...	...	935,000	73,000
1919 ...	...	968,000	73,000

#### *Estimated Coal Reserves of Russia* (in millions of tons).

*Abstracted from "The Coal Resources of the World."*

Coalfield.	Seams.	Area (sq. miles).	Actual.	Prob- able.	Total.
ANTHRACITE AND BITUMINOUS COAL.					
Dombrova Basin ...	...	—	320	2,525	2,525
Moscow Basin ...	...	—	—	20	20
Donetz Basin (smoky coals).	1-7 ft.	4,800	18,014	—	18,014
Donetz Basin (anthracite)			37,599	—	37,599
West slope of Urals ...	1-8 ft.	—	57	Large	57
Caucasus ...	...	—	12	278	290
BROWN COAL.					
Dombrova basin ...	..	—	28	63	63
Moscow basin ...	...	—	—	58	1,500†
Provinces of S. and S.W. Russia.	1 ft. 6 ins.— 14 ft.	10	—	44	44

\* Iron and Coal Trades Review (London), Jan. 9th, 1920, p. 48.

† Including bituminous coals.

*Analyses of Russian Coals.\**

Coalfields and Mines.	Proximate Analysis.					Ultimate Analysis.						Calori- fic Valne. Ash.	Coke.
	Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Mois- ture.	Carbon.	Hydro- gen.	Oxy- gen.	Nitro- gen.	Sul- phur.	Per cent.	Cals. 6,328 6,988	
<i>Dombrowska Basin</i> :—					Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.	Percent.
Mortimer	...	...	...	...	...	12.91	4.14	11.49	1.50	0.95	5.01	56.01	
Milovice	...	...	...	...	...	11.19	61.00	11.46	1.17	4.43	2.30	58.09	
<i>Moscow Coalfield</i> :—						[5.61]	62.63	6.92	...	...	[26.92]		
Obidimo	...	...	...	...	...	[4.68]	76.56	8.75	14.69	...	[10.75]		
Chulkovo	...	...	...	...	...								
Govt. of Tver:— <i>Vishni-Volochek</i> (brown coal)	9.87	43.46	30.47	16.35	[9.04]	68.27	5.71	22.95	...	...	...	54.30	
<i>Donetz Basin</i> :—						[0.82]	87.28	4.61	5.34	...	...		
Lisichanski District (smoky coal)	...	...	...	...	...	[0.65]	91.27	2.38	1.51	1.55	1.00	84.40	
Usvorski District (smoky coal)	...	...	...	...	...	...	...	...	...	...	...	2.77	
Bokovo District (anthracite)	...	...	...	...	...	...	...	...	...	...	...	...	
<i>Coastal S.W. Provinces</i> :—						...	...	...	...	...	...		
Volya Province (brown coal)	...	...	...	...	...	...	...	...	...	...	...		
<i>New Russia</i> :—													
Govt. of Bessarabia:—Ismail District (ignite)	30.44 to	13.05 to	18.34	30.00	...	...	...	...	...	...	...	...	
Govt. of Kherson:—Elizabetgrad District (brown coal)	32.90	...	...	...	...	...	...	...	...	...	...	...	
<i>Lithuania</i> :—													
Govt. of Grodno:—Jidovskhina (ignite)	18.46	23.43	37.34	25.77	...	...	...	...	...	...	...	...	
Grodno Vilna:—Vilno and district of Lida	47.00	37.75	15.25	...	...	...	...	...	...	...	...	5,380	
<i>West Slope of Ural</i> :—													
Luryevski coalfield:—Innva	...	...	...	...	...	...	...	...	...	...	...		
Kizel coalfield	...	...	...	...	...	...	...	...	...	...	...		
Gubakhninski coalfield	...	...	...	...	...	...	...	...	...	...	...		
<i>Caucasus</i> :—													
Suchum District	...	...	...	...	...	...	...	...	...	...	...	...	
Kutais District	...	...	...	...	...	...	...	...	...	...	...	...	
Kuban District:—Khumarinskaya	...	...	...	...	...	...	...	...	...	...	...	...	
Otti District (No. 2 Seam)	...	...	...	...	...	...	...	...	...	...	...	...	
						4.96	67.07	4.73	15.00	2.52	10.68		

*Production of Coal in European Russia*  
(in thousands of long tons).

Coalfield.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Donetz (Ukraine)	24,774*	26,951†	27,565†	28,242*	24,855*	8,898*	5,000*
Dombrova (Poland)	6,730§	3,722‡	2,952	5,116	6,145§	4,329	4,589
Ural ... ...	1,026*	1,357‡	1,268‡	1,409*	1,593*	771*	693*
Moscow ... ...	271*	306‡	457‡	615*	725*	392*	389*
Caucasus ... ...	60¶	65‡	74‡	63‡	56‡	50¶	50¶
TOTAL ...	32,861	32,401	32,316	35,445	32,874	14,440	10,671

\* Russian Economist, April, 1921, p. 732.

† Ibid., January, 1921, p. 305.

‡ Montan. Rundschau, March 1, 1919, p. 186.

§ Iron and Coal Trades Review, April 30, 1920, p. 590.

|| Ibid., September 10, 1920, p. 331.

¶ Estimated.

### Serbia.\*

Coal of Carboniferous, Jurassic and Cretaceous ages occurs in Serbia, also brown coal and lignite of Cretaceous and Tertiary ages. The true Coal-Measures are found north of the mountainous region between the Pek and Mlava Rivers, but the seams are thin, the coal is brittle and somewhat impure, and the reserve is relatively small. The Jurassic coal is found in north-eastern Serbia. It resembles the Carboniferous coal, and, like it, requires picking and washing. It has, in places, a calorific value of 8,000 cals. It is worked chiefly at Dobra, Vrska Chuka and Serbski Balkan. Brown coal of Cretaceous age is worked at Rtanj, Dobra Sretsa, Bogovina, Vina, Podvis and Oresats. The coal is a bright-black "glaenz," with a calorific value of 6,500 to 7,500 cals. At Rtanj it produces a clear grey-black coke with a metallic lustre, which is said to be of good quality. Brown coal of Tertiary age is worked at Senski Rudnik (or Senje), Resava, Sisevats, Moravats, Alexinats, Jelasnitsa and Jarandol.

The Senski Rudnik coal-mines are, at present, the most important in Serbia. They belong to the State and are under the management of the Minister of Railways in Belgrade. The main seam has a general thickness of 32 feet 6 inches to 39 feet, but in places it reaches a thickness of 130 feet. The coal contains little moisture or ash, and has a calorific value of about 5,000 cals. It is suitable for heating, smelting, forging and general industrial purposes. A briquette factory has been installed, with a capacity of about 200 tons of briquettes per day. The output of the Senski Rudnik mines amounts to nearly 100,000 tons per annum, and is used exclusively by the

\* The Geology and Mineral Resources of the Serb-Croat-Slovene State, by D. A. Wray, Department of Overseas Trade, London, 1921. Coal Resources of the World, 1913, Vols. I and III.

State Railways. Lignite of Tertiary age is worked at Klemovnik, Kostolatz and many other places. At Klemovnik the main bed of lignite has a thickness of 80 to 90 feet. The lignite is brownish-black in colour and has a calorific value of about 3,400 cals.

The production of coal in Serbia during the years 1913 and 1919 was 306,361 tons and 102,063 tons respectively.

*Coal Resources of Serbia\**

(in thousands of tons).

	Actual Reserve.			Probable Reserve.			Possible Reserve.		
	Coal.	Brown Coal.	Lignite.	Coal.	Brown Coal.	Lignite.	Coal.	Brown Coal.	Lignite.
Danube and Timok Valley	2,000	3,450	22,350	8,000	15,000	65,000	30,000	20,000	80,000
Morava district ...		23,250	6,300	2,500	65,900	12,850	3,000	83,000	35,500
Shumadija district ...		600	400		1,750	600		2,000	2,000
Podrinje, Possavina and Western Serbia		300	1,050		800	20,650		500	20,500
TOTAL ...	2,000	27,600	30,100	10,500	82,950	99,100	33,000	105,500	138,000

\* Coal Resources of the World, 1913, Vol. III.

*Analyses of Serbian Coal and Lignite.*

No.	Ccalfield.	Ultimate Analysis.						Calorific Value.
		Moisture.	Carbon.	Hydrogen.	Oxygen and Nitrogen.	Sulphur.	Ash.	
1	<i>Carboniferous :</i> Mlava-Pek (average)	Per cent. 2·61	Per cent. 68·14	Per cent. 3·28	Per cent. 7·41	Per cent.	Per cent. 18·56	Cals. 6,616
2	<i>Jurassic :</i> Dobra ... ...	3·05	77·58	4·41	12·28		2·68	7,168
3	Vrska Chuka ...	1·18	86·42	3·81	4·06		4·53	8,089
4	<i>Cretaceous :</i> Rtanj ... ...	0·74	74·05	4·15	4·74		16·22	7,336
5	Vina ... ...	1·27	64·56	4·18	2·16	10·05	17·98	6,517
6	Podvis ...	5·29	71·45	5·26	12·01		1·74	7,145
7	<i>Tertiary :</i> Senski-Rudnik	12·63	59·85	4·44	19·41		3·67	5,285
8	Alexinats ...	9·43	60·00	3·68	23·89	0·71	2·26	5,012
9	Jelasnitsa ...	21·00	45·20	3·51	20·18		10·11	4,075
10	Bela Crkva ...	14·38	55·69	3·50	21·58		4·85	4,713
11	Kostolatz ...	12·13	46·46	3·44	23·12		14·85	3,738
12	Zwesdan ...	30·79	40·13	3·31	14·37		11·40	3,510
13	Bunosevchi, Vranje	10·99	53·71	4·44	25·48		5·43	4,731

1. Coal Resources of the World, 1913, Vol. III.  
2-13. D. A. Wray (*loc. cit.*).

### Spain.\*

† The coalfields of Spain are said to cover 3,500 square miles, and to contain 2,548 million tons of coal. They are divided into three groups:—(1) the northern coalfield extending through Oviedo (Asturias), Leon and Palencia; (2) the southern coalfield in the provinces of Seville, Cordova, and Ciudad Real; and (3) the north-eastern coalfield in the provinces of Gerona and Lerida. The principal mines are in the provinces of Oviedo, where there are 120 seams, 50 of which are worked, and are of good quality, varying in thickness from 16 in. to 6 ft. Anthracite occurs in the provinces of Cordova and Palencia, and lignite in nine provinces, the principal field being at Utrillas, in the province of Teruel.

In 1913, 3,951,192 tons of coal and 272,343 tons of lignite were produced, and 2,658,489 tons of coal were imported—the imports of fuel for the preceding three years showed a rapid increase. In 1914, the production of coal and lignite increased to 4,066,953 tons, and 286,379 tons, respectively, while the imports of coal fell to 2,464,726 tons.

In 1915, the output of coal increased to 4,288,492 tons, and the lignite production to 322,938 tons, while the imports of coal fell, heavily, to 1,698,587 tons.

In 1916, notwithstanding an increased production of coal and lignite of nearly one million tons over the previous year, making, with imports, an available supply of about 7½ million tons, there was a shortage of at least half a million tons. As a result of this shortage, decrees were issued at different times fixing the price of coal. One of these decrees, made towards the close of 1916, fixed the maximum prices at a number of different points, from 20s. 3d. to 27s. 9d. per ton for coal, 38s. 3d. per ton for foundry coke, and 32s. 3d. per ton for anthracite. So acute was the shortage at particular times during the year, that the gas supply in Madrid and other cities had to be cut off.

In 1918 the production of coal and lignite amounted to 7,122,216 tons, showing an increase of 69 per cent. over that of 1913.

The following is a comparison of the prices of Asturia (Oviedo) coal per ton f.o.t. at mine:—

		July, 1914.	July, 1919.
		<i>s. d.</i>	<i>s. d.</i>
Screened	...	23 6	85 4
Large	...	21 11	83 9
Screenings	...	19 6	75 7
Small	...	13 10	55 3

\* Estadistica Minera de España (Annual). Estadistica del Comercio Exterior de España (Annual).

† "The Times" (London), Fuel Number, 1914, p. 19.

The coal reserves of Spain are estimated to be as follows :—\*

	Actual.		Probable.	
	Area.	Quantity.	Area.	Quantity.
Seams of 1 foot and over to a depth of 4,000 feet	Square miles. 3,340	Millions of tons. 4,500	Square miles. 3,123	Millions of tons. 1,037
Seams of 2 feet and over between 4,000 and 6,000 depth.	1,035	1,720	3,832	1,511
TOTAL ... ...		6,220		2,548

\* Coal Resources of the World, 1913, Vol. II, pp. 644-5.

*Analyses of Spanish Coals.*

No.	Locality.	District.	Proximate Analysis.				Ultimate Analysis.				Calorific Value.	Coke, Per cent.
			Moisture.	Fixed Carbon.	Volatile Matter.	Ash.	Carbon.	Hydrogen.	Oxygen	Sulphur.		
1	Cordova	Cabeza de Vaca ..	...	...	...	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Oals, 6.384	39
2		Santa Elisa ..	...	...	...	64-38	36-32	4-72	8-33	1-50	12-30	
3	Baniel	...	...	...	...	73-00	24-30	2-60	9-05	2-60	7.967	
4	Belmez	...	...	...	...	65-00	23-00	12-00		0-85	7.300	76-8
5	"	...	...	...	...	1-60	23-20	3-10		1-02	8,490	84-0
6	"	(briguette) ..	...	...	...	1-80	16-00	3-50				
7	"	"	...	...	...	72-22	13-33	14-45				
8	"	"	...	...	...	48-4-75	13-43-2	2-6-12				
9	Asturias	Penarroya ..	...	...	...	2-20	11-10	4-90		0-82	8.162	88-90
10		Aller Frevenida ..	...	...	...	...	82-80	17-20	[4-28]		7,350	
11		Esparranza ..	...	...	...	...	77-00	23-00	[6-50]		6,980	
12	Aller	...	...	...	...	1-20	13-80	6-20		0-78	7,687	86-2
13	Mieres	...	...	...	...	2-30	32-00	2-40		1-14	7,298	68-0
14		Vera, near Gijon ..	...	...	...	4-56	87-46	3-57			7,500-8,000	
15	Castille	Puertollano coalfield ..	...	...	...	48	42	10				
16		Sabero ..	...	...	...	...	83-97	1-08	14-05			
17		Fuenteviejuna la Parvilla mine (anthracite)	...	...	...	...	18-23-05	2-3-8-10				
18	Leon	Sucesiva seam ..	...	...	...	83-20	7-62	9-18				
19		Alundina seam ..	...	...	...	...	79-53	11-89	8-07			
20		Patenilina seam ..	...	...	...	72-89	20-63	6-12				
21	Palencia	Guardo ..	...	...	...	...	68-13	14-93	13-11	0-51	82-97	79-00
22		Gervera del Rio de Pisuenga Guardo ..	...	...	...	1-68-5-91	84-98-16	2-89-9-82	2-98-7-75	1-36	3-83	
23		Rio Pisuenga ..	...	...	...	4-50	87-46	3-66	4-40	0-88-1-401	7.697-7.783	[8-18]

*Analyses of Spanish Coals—continued.*

No.	Locality.	District.	Proximate Analysis.				Ultimate Analysis.				Calorific Value.
			Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Carbon.	Hydro-gen.	Oxygen.	Sul-phur.	
24	Palencia	...	Barruelo	...	...	...	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
25	Ternel	...	Utrillas	...	...	...	74·10-83·80	64·70	4·00	4,700-5,000	Per cent.
26	Gerona	...	Utrillas and Gargallo (aver.)		...	...	41·45	6-9		4,938	Cals.
27	Barcelona	...	Saravastre and Ilivia (aver.)		...	...	31·86	66·60	11·54	5,200	Per cent.
28			Calaf Basin (aver.)		...	...	52·53	41·43	4·7		
29			Vallebre (aver.)		...	...					

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*Production of Coal in Spain.*

Year.	Quantity (long tons).			
	Anthracite.	Bituminous Coal.	Lignite.	Total.
1913 ... ... ...	228,780	3,722,412	272,343	4,223,535
1914 ... ... ...	224,633	3,842,320	286,379	4,353,332
1915 ... ... ...	219,043	4,069,449	322,938	4,611,430
1916 ... ... ...	263,778	4,769,569	465,503	5,498,850
1917 ... ... ...	319,537	4,961,177	627,590	5,908,304
1918 ... ... ...	371,154	6,036,388	714,674	7,122,216
1919 ... ... ...	392,362	5,219,609	584,328	6,196,299

*Imports and Exports of Coal into and from Spain.*

Year.	Imports.		Exports.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ... ...	2,658,489	2,785,477	13,332	13,969
1914 ... ... ...	2,464,726	2,582,459	4,911	5,145
1915 ... ... ...	1,698,587	1,803,320	9,657	10,253
1916 ... ... ...	1,984,823	2,198,170	37,050	41,032
1917 ... ... ...	1,076,316	1,346,652	77,535	97,009
1918 ... ... ...	457,967	624,761	130,237	177,670
1919 ... ... ...	792,006	939,764	141,544	167,950

\* Values converted to £ sterling at the average rate of exchange for each year.

*Spanish Production of Coke, Imports of Coke and Briquettes; and Exports of Coke.*

Year.	Production of Coke.	Imports of Coke and Briquettes.		Exports of Coke.	
	Quantity (long tons).	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ..	586,104	390,048	550,145	107	130
1914 ... ..	587,715	364,809	514,547	250	302
1915 ... ..	613,335	175,820	251,275	1,007	1,233
1916 ... ..	747,544	131,893	196,633	964	1,232
1917 ... ..	534,044	72,183	121,575	260	375
1918 ... ..	620,082	59,582	109,418	21	33
1919 ... ..	423,942	94,112	150,325	74	101

\* Values converted to £ sterling at the average rate of exchange for each year.

**Sweden.\***

*Peat.*—Sweden is said to possess the largest supply of peat in the world, with the exception of Russia. It is estimated that there are 10 million acres of peat, with an average depth of  $6\frac{1}{2}$  ft., equal to about 800 tons per acre, or a gross total of 8,000 million tons. Peat is dug for use as a household fuel, and for making peat-litter and peat-mould.

\* Bergshantering, Berättelse av Kommerskollegium (Annual). Handel Berättelse av Kommerskollegium (Annual).

*Coal.*\*—Little coal is mined in Sweden, and England formerly supplied the greater part of Sweden's requirements. The English deliveries fell off during the war, but there was a large increase in the import of coal and coke from Germany, chiefly derived from Belgium. There was also a small import from Spitzbergen, and a beginning was made to import coal from the United States. It is not anticipated that the latter will compete seriously with British coal when England is in a position to increase her supply.

All the Swedish coal obtained in 1912 was produced from the provinces of Malmöhus and Kristianstad, in the southern part of the kingdom. The seams are interstratified with beds of fire-clay, and the two minerals are worked together. The thickness of the coal seams, including the partings of shale, varies from three to five feet.

Sweden suffered considerably during the war from lack of fuel, as she produced only 4 per cent. of her consumption and was largely dependent on English exports. Fortunately, the coal in stock was so large that it lasted till the spring of 1915, when the shortage began to be felt in the industries and the price rose. For a time, supplies were obtained from England, and large quantities were imported from Germany and Belgium, but the latter was not always of good quality. In the autumn and winter of 1915 and in the early part of 1916, supplies from England fell off, and prices rose by about 200 per cent.

Later, Sweden was again able to obtain coal from England, in return for goods, but only in small quantities, and the railways, especially, suffered severely. The Government was obliged to seek for substitutes, such as the greater use of water power and the extended employment of peat.

Towards the close of 1915 the Swedish Government arranged with England to import 130,000 tons of anthracite, the disposition being entrusted to the Swedish Food Commission.

When Italy entered into the war, it became increasingly difficult for neutral ships to obtain coal, and numbers of Swedish vessels were obliged to lie idle in English ports.

Germany at first largely made up the deficiency, but, by the end of 1917, this relief ceased, as the coal was required for her own needs.

In the winter of 1917 a Coal Commission was appointed in Sweden to work out a scheme for the rationing of wood, peat, and other home fuel.

The estimated bituminous coal reserve, based on an assumed area of 46,500 acres for actual, and an additional 3,000 acres for probable reserve, is as follows :—†

	Tons.
Actual reserve ...	... 106,482,000
Probable reserve ...	... 8,265,000
<b>TOTAL</b> ...	<b>114,747,000</b>

\* Sveriges Officiella Statistik för år 1912, Stockholm, 1913.

† Coal Resources of the World, 1913, Vol. I, p. xcix.

*Production of Peat in Sweden.\**

Year.	Peat Fuel.		Pressed Peat Mould.		Powdered Peat		Pressed Moss Litter.		Peat Briquettes.	
	Quantity (long tons).	Value† (£).	Quantity (long tons).	Value† (£).	Quantity (long tons.)	Value† (£).	Quantity (long tons).	Value† (£).	Quantity (long tons).	Value† (£).
1913	...	...	58,700	27,350	28,563	21,539	3,936	2,314	142,580	117,815
1914	...	...	36,162	20,578	29,800	22,387	3,328	2,374	163,486	140,689
1915	...	...	75,122	53,832	34,180	27,451	3,004	4,498	202,344	190,382
1916	...	...	101,344	113,023	28,022	30,978	2,278	5,420	176,005	201,209
1917	...	...	171,883	411,871	30,015	53,179	5,41	2,454	162,589	292,429
1918	...	...	342,372	1,121,937	28,961	73,274	1,557	10,940	192,581	483,245
1919	...	...	307,444	1,746,839	30,726	80,376	4,664	27,257	209,636	492,368

\* In addition about 100 cubic yards of Moss Litter and Peat Mould for sale in unpressed forms was produced each year.

† Values converted to £ sterling at the average rate of exchange for each year.

*Export of Peat Litter and Mould from Sweden.*

Year.	Quantity (long tons).	Value* (£).
1913 ... ...	7,020	7,862
1914 ... ...	8,837	7,982
1915 ... ...	25,890	27,059
1916 ... ...	19,887	31,084
1917 ... ...	3,909	8,620
1918 ... ...	2,375	6,720
1919 ... ...	1,932	6,421

\* Values converted to £ sterling at the average rate of exchange for each year.

*Analyses of Swedish Coals.*

No.	Mine.	Seam.	Ultimate Analysis.						
			Moisture.	Ash.	Sulphur.	Carbon.	Hydrogen.	Nitro- gen.	Oxygen.
1	Höganäs ...	Lower	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
2	" ...	"	10·22	4·95	1·01	68·38	4·48	0·88	10·08
3	" ...	"	10·01	17·52	0·91	55·54	3·81	0·88	11·38
4	" ...	"	10·00	35·82	0·84	36·21	2·79	0·59	13·80
5	Billesholm ...	Upper	10·00	46·05	0·77	28·75	2·52	0·53	11·38
6	" ...	"	10·66	4·44	0·66	66·41	4·27	1·04	12·77
7	Bjuf ...	"	14·20	13·37	0·61	54·43	3·65	0·85	13·10
8	" ...	Lower	10·32	9·64	0·76	60·84	3·96	1·05	13·72
9	" ...	"	10·86	9·81	1·22	60·81	4·29	0·94	12·53
10	West Gotland	"	8·99	34·52	1·03	42·20	3·06	0·69	9·90
			4·85	22·28	3·99	60·24	4·64	0·50	3·50

1-9. Coal Resources of the World, 1913, Vol. III, p. 1180.

10. Zeitschrift für Krystallographie, Vol. XXXVII, pp. 286-288. Journ. of Chem. Soc. (London), Vol. LXXXIX, p. 305.

*Production of Coal in Sweden.*

Year.	Quantity (long tons).	Value* (£).
1913 ... ...	358,116	162,481
1914 ... ...	360,747	170,558
1915 ... ...	405,635	255,193
1916 ... ...	408,158	368,515
1917 ... ...	435,519	651,635
1918 ... ...	397,993	974,316
1919 ... ...	422,368	1,104,711

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Coal into Sweden.*

	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Anthracite ...	148,240	149,361	88,998	160,704	19,070	8,236	46,659
Gas Coal ...	388,952	414,199	326,243	387,794	138,709	195,492	268,233
Steam Coal ...	3,920,756	3,658,825	3,113,712	3,019,708	1,212,622	1,689,405	1,503,872
Other ...	347,497	330,186	245,089	403,377	109,189	100,169	80,822
<b>TOTAL</b> ...	<b>4,800,444</b>	<b>4,552,571</b>	<b>3,774,042</b>	<b>3,971,580</b>	<b>1,479,590</b>	<b>1,943,302</b>	<b>1,899,586</b>
Value* (£).							
Anthracite ...	232,425	172,567	133,010	363,625	48,183	106,647	315,308
Gas Coal ...	386,998	390,187	506,249	974,169	526,606	1,842,373	1,908,498
Steam Coal ...	3,951,865	3,109,458	4,487,583	6,516,899	3,704,298	12,744,731	10,872,106
Other ...	330,795	294,815	405,206	968,716	495,091	835,892	553,178
<b>TOTAL</b> ...	<b>4,902,083</b>	<b>3,967,027</b>	<b>5,632,048</b>	<b>8,823,409</b>	<b>4,774,178</b>	<b>15,529,643</b>	<b>13,649,090</b>

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Coke and Briquettes into Sweden.*

Year.	Coke.		Briquettes.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ...	487,897	764,972	24,340	21,807
1914 ...	442,351	473,806	14,904	14,664
1915 ...	1,200,832	1,854,984	236,723	455,079
1916 ...	1,275,330	2,983,932	871,545	2,087,646
1917 ...	511,949	2,285,750	295,997	1,288,348
1918 ...	502,713	4,114,790	301,904	2,458,341
1919 ...	274,938	2,166,760	16,690	135,744

\* Values converted to £ sterling at the average rate of exchange for each year.

**Switzerland.\***

Anthracite is mined in the Canton of Wallis. The available reserve is not known, but it probably amounts to many millions of tons. Statistics of production prior to 1917 are not available, but in that year about 7,400 tons were raised, and in 1918 the

\* Statistique du Commerce de la Suisse avec l'Étranger (Annual). Rapport sur le Commerce et l'Industrie de la Suisse, 1919. Annuaire Statistique de la Suisse, 1918. Der Schweizerische Bergbau, by H. Fehlmann, 1919.

output was 40,818 tons. In 1918, the production of brown coal was 5,819 tons and that of lignite 67,389 tons. The production of briquettes in 1918 was 29,699 tons.

*Imports of Coal into Switzerland.*

From	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom	29,870	30,626	737	488	2,590	12,675	52,662
Belgium ...	128,397	76,171	163,125	254,557	148,794	124,993	240,693
France ...	193,769	118,784	6,767	1,810	11,568	68,365	248,870
Germany ...	1,565,014	1,405,421	1,655,425	1,341,982	1,049,664	932,947	217,359
Other Countries...	20,751	39,022	12,908	141	219	909	478,371
TOTAL ...	1,937,801	1,669,974	1,838,962	1,598,978	1,207,855	1,139,889	1,237,955
Value* (£).							
United Kingdom	44,588	51,885	1,917	2,024	11,887	88,816	395,326
Belgium ...	204,382	124,318	290,571	582,083	427,814	922,648	1,535,249
France ...	265,493	167,469	10,886	4,434	33,294	362,714	1,734,905
Germany ...	1,828,975	1,699,100	2,385,535	2,465,874	3,458,529	6,688,012	1,591,724
Other Countries...	30,703	59,422	22,713	314	934	4,711	3,814,151
TOTAL ...	2,374,091	2,102,144	2,711,572	3,054,729	3,927,458	8,016,901	9,071,355

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Lignite into Switzerland.*

From	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Austria-Hungary ...	874	1,380	756	6,294	5,921	19,886	3,579
Germany ...	289	879	435	153	9	40	—
Other Countries ...	340	95	—	—	—	8	238
TOTAL ...	1,503	2,354	1,191	6,447	5,930	19,934	3,817
Value* (£).							
Austria-Hungary ...	1,020	1,667	1,058	12,850	11,880	114,637	17,110
Germany ...	338	1,062	610	312	24	451	—
Other Countries ...	433	124	—	—	2	20	2,273
TOTAL ...	1,791	2,853	1,668	13,162	11,906	115,108	19,383

\* Values converted to £ sterling at the average rate of exchange for each year.

*Exports of Coke from Switzerland.*

		Quantity (long tons).	Value* (£).
1913	...	10,213	13,779
1914	...	5,821	7,108
1915	...	1,837	3,050
1916	...	221	435
1917	...	92	290
1918	...	125	501
1919	...	—	—

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Coke into Switzerland.*

From	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom	1,266	572	47	239	14,783	38,124	17,361
Belgium	5,727	3,932	3,983	30,597	6,032	192	36,485
France	53,469	36,582	2,454	7,485	16,402	20,897	39,471
Germany	365,176	399,268	572,240	763,205	569,512	597,523	79,827
United States	6,100	2,732	—	—	—	—	18,016
Other Countries...	694	1,161	751	635	4,170	6,287	2,729
TOTAL	482,432	444,197	579,475	802,161	610,899	663,023	188,339
Value* (£).							
United Kingdom	2,847	1,082	113	703	71,801	186,883	89,237
Belgium	8,558	5,941	8,131	77,460	16,106	1,065	214,451
France	91,575	63,306	5,206	21,395	73,199	98,895	287,736
Germany	588,646	627,510	984,964	1,620,526	1,803,544	4,773,819	657,719
United States	20,896	9,360	—	—	—	—	117,067
Other Countries...	977	1,551	1,133	2,023	12,244	43,636	29,502
TOTAL	712,979	708,750	999,547	1,722,107	1,976,894	5,099,298	1,395,712

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports of Briquettes into Switzerland.*

From	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom	172	170	10	—	—	10	11,596
Belgium	10,226	11,218	79,740	104,248	7,284	873	162,112
France	72,051	43,923	2,471	72	79	94	5,827
Germany	868,768	880,619	755,129	582,715	401,013	283,146	97,043
Other Countries...	1,752	5,494	1,245	6,254	352	15	696
TOTAL	952,964	941,424	888,595	698,239	408,728	284,137	276,774
Value* (£).							
United Kingdom	271	275	23	—	—	28	80,060
Belgium	14,629	15,370	127,676	217,095	20,993	5,021	958,962
France	92,914	57,526	3,511	130	240	388	33,062
Germany	997,786	1,046,891	1,073,058	1,058,835	1,065,137	1,795,370	701,286
Other Countries...	2,358	7,412	1,957	11,363	561	72	2,359
TOTAL	1,107,958	1,127,474	1,206,225	1,287,423	1,086,931	1,800,824	1,775,729

\* Values converted to £ sterling at the average rate of exchange for each year.

### Turkey-in-Europe.

Under the Treaty of Sèvres, 1920, Turkey lost Thrace to Greece, and the territory of Turkey-in-Europe is now confined to the city and district of Constantinople.

Lignite is mined near Lake Derkos, at Kara Burnu, just outside the north-west corner of the vilayet of Constantinople. This mine has been worked only since the outbreak of the war. Its produce is brought down to Constantinople by a light tramline, which, for some distance, follows the valley of the Sweet Waters. The output is of inferior quality, and has to be mixed with better coal when used for other purposes than domestic heating. In August, 1917, the mine was producing 70 to 80 tons a day, all of which was sold in Constantinople.

At Keshan in Thrace there are seams of lignite of very good quality. During the war the output rose to 80 tons a day, with the prospect of a further increase, and a narrow-gauge railway was being built from Pavlo Keui, on the Oriental Railway, to Keshan, most probably with a view of exploiting this coal deposit.

Lignite mines exist also near Rodosto, on the Sea of Marmora. These were not worked before the war, but it appears that they are now being exploited. The output is shipped to Constantinople. The coal resembles that found at Keshan. There are also coal deposits in the neighbourhood of Adrianople.

## FOREIGN AFRICA.

### Abyssinia.\*

Coal is known to occur near Adis Abbaba, and deposits are reported at Gondar, north of Lake Tsana, upon the island of Derke in that lake, also in the valley of the Didessa river. Several beds of good lignite, from 6 inches to 1 foot  $9\frac{1}{2}$  inches in thickness outcrop at Chelga, about 18 miles north of Lake Tsana. Analyses of the samples appear to show that these deposits are worth working in order to supply the local need for fuel in Abyssinia and in the Sudan.

### Algeria.†

- ‡In 1918, some coal seams were discovered at Kenadia, in the Columb-Bechar region.

Deposits of lignite are worked near the village of Marceau, 48 miles from Algiers. The output is consumed locally.

§It is stated that deposits of lignite, several feet in thickness, have been discovered at Oued-Mougras, in the district of Souk-Ahras.

\* Coal Resources of the World, 1913, Vol. II, p. 380.

† Statistique de l'Industrie Minérale en France et en Algérie (1914-18).

‡ The French Year Book, 1919, p. 866.

§ Dépêche Coloniale (Paris), December 1st, 1908. Board of Trade Journal (London), Vol. lxiii, p. 515.

*Algerian Production and Imports of Coal.*

Year.	Quantity (long tons).			Imports.†	
	Production.				
	Coal.	Lignite.	Total.		
1913 ... ... ...	—	—	—	2,215,000	
1914 ... ... ...	—	—	—	1,665,000	
1915 ... ... ...	—	—	—	1,467,000	
1916 ... ... ...	—	—	—	1,134,000	
1917 ... ... ...	—	2,199	2,199	745,000	
1918 ... ... ...	4,920	1,985	6,905	362,952	
1919 ... ... ...			7,300*	519,735	

\* Provisional figure, subject to revision.

† 1913-1917 figures include bunker coal. Whether this is so for 1918 and 1919 is not known.

**Belgian Congo.**

\* Two coal-bearing areas are known in the Belgian Congo, one on the Lukuga River, between Kingombe and Milange, and the other on the upper Lualaba River and its tributaries, the Luweisha, Shiwa, and Kasope.

In the first-named field, the strata, which lie almost horizontally, contain three coal seams, with a minimum aggregate thickness of 3 feet 9 inches, underlying an area of at least 12 square miles. The coal contains about 40 per cent. of volatile matter, and 10 per cent. of ash.

In the rocks of the Lualaba area, a number of coal seams occur, with thicknesses of 3 feet 3 inches or more. The coal-bearing beds outcrop over an area  $23\frac{1}{2}$  miles in length and from 3 to  $4\frac{1}{2}$  miles in width, or about 88 square miles. The coal, as a rule, is dirty and contains a high percentage of sulphur. An average analysis of the best seams shows 48 per cent. of fixed carbon, 29 per cent. of volatile matter, and 9·5 per cent. of ash. Other seams yield from 40 to 50 per cent. of ash.

† It is reported that important coal deposits have been discovered near Bukama, in the Moero district.

‡ The probable reserve of coal in the Belgian Congo is estimated to be as follows :—

	Tons.
Lukuga (Coal) ... ... ...	90,000,000
Lualaba (Lignite) ... ... ...	900,000,000
<b>TOTAL</b> ... ... ...	<b>990,000,000</b>

**Tanganyika Territory**

(formerly German East Africa).

§ Coal is found in Karroo strata (Permo-Triassic) which overlie and occupy trough-fault depressions in the ancient gneisses and schists in various parts of the upland plateau.

\* Coal Resources of the World, 1913, Vol. II, p. 425.

† Iron and Coal Trades Review (London), Vol. C, No. 2728 (1920), p. 805.

‡ Coal Resources of the World, 1913, Vol. I, p. xxxii.

§ Report on Tanganyika Territory [Cmd. 1428], 1921.

There is a large deposit of coal in Songwe, at the northern end of Lake Nyasa, and coal occurs also near Wiedhafen, on the eastern shore of the same lake. The coal is not worked, as wood is at present a cheaper fuel for the steamers.

A sample of Lake Nyasa coal gave a calorific value of 6,500 calories.

At Kwiwo, in the district of Neu-Langenburg, there is a seam of caking coal, which varies considerably in quality, some samples giving a heating value of 6,500 calories, but others much less.

### Madagascar.

Coal has been found near Bénénitra, in the south-west corner of Madagascar, in two areas known, respectively, as the Ianapera and Ambohibaty basins.

\*Four seams were discovered in the larger or Ianapera area, ranging from about 1 foot to 8 feet 4 inches in thickness. The coal resembles boghead coal or cannel, being hard and tough and having a conchoidal fracture. It contains a rather high percentage of ash.

†After being suspended for several years, exploration at Ianapera was resumed in 1919. The quality of the coal has improved with the depth, and analyses made recently at the official laboratory of the Colony give : volatile matter 32 per cent., ash 19 to 20 per cent., and calorific value 7,000 calories. In order to encourage production, it would be necessary to construct a railway from Bénénitra to Tulear, on the west coast, a distance of about 100 miles. The Onilahy valley, through which the railway would run, is stated to be eminently suitable as being the most fertile valley in those regions. The Permo-Triassic belt of strata, in which the coal beds occur, stretches the entire length of the island, from the south-west to the north, and there is good reason for hoping that other deposits of coal will be found. In fact, a small outcrop of coal, with a calorific value equal to that of Ianapera, has been discovered near Amposa, in the north-west.

### *Analyses of Madagascar Coals. †*

Coalfield.	Proximate Analysis.				Sulphur.	Calorific Value.
	Moisture.	Fixed Carbon.	Volatile Matter.	Ash.		
Ianapera nr. Bénénitra ...	Per cent. 2-4	Per cent. 41-48	Per cent. 27-32	Per cent. 18-26	Per cent. 0·7-1·3	Cals. 5,500-6,500
Onilahy ... ...				18-20		5,500-6,500
<i>Betioky River</i>						
Ianapera No. 1 Seam ...	3·40	44·36	29·00	23·24	0·76	5,765
" No. 2 "	4·02	43·36	27·38	25·24	1·08	5,670
" No. 3 "	3·38	42·31	29·77	24·54	0·71	5,724
L'Amporopoty river ...	2·42	47·66	31·68	18·24	1·30	6,515

\* Coal Resources of the World, 1913, Vol. I, p. lx.

† Bulletin Économique de Madagascar, publié par les soins du Gouvernement Général ; premier et deuxième trimestre, 1920, p. 21.

‡ Coal Resources of the World, 1913, Vol. II, pp. 417-424.

### **Portuguese East Africa (Mozambique).**

\*The known coal areas, apart from small outcrops discovered in isolated places, extend from Sinjal, where the coal is of an inferior quality, to Chikoa, over a stretch of 190 miles; another coal region lies to the north of the Kansunsa River, beyond its junction with the Moatizi; also, it is reported that coal occurs in various districts south of Tete along the Inyampumpa and south of that river, as well as in the Karroo beds of the lower Shire River in Portuguese territory at Zimbabwe, and at Nkombedzi and Namalundo in British territory.

In 1895 the Companhia Hulheira da Zambezia began operations in the neighbourhood of Tete, at Kakanga, and at Goma, about 8 miles from Port Herald, but operations ceased in 1913.

†Coal deposits occur near Lourenço Marques, extending over an area of 3,500 square miles. A small London company was formed in 1919 to develop a portion of this area.

### **Tunis.‡**

The production of lignite in Tunis began in 1916, and the output increased more than four-fold by 1918.

Year.						Quantity (long tons).
1916	...	...	...	...	...	10,450
1917	...	...	...	...	...	32,157
1918	...	...	...	...	...	45,561
1919	...	...	...	...	...	35,000*

\* Exports.

## **FOREIGN NORTH AMERICA.**

### **Alaska (United States).**

§ It is estimated that an area of about 16,147 square miles in Alaska is underlain by coal-bearing formations, of which 1,210 square miles are known to be underlain by coal beds. The principal coalfields are :—Bering River (coal), Matanuska (coal), Cook Inlet (lignite), Alaska Peninsula (lignite), Nenana (lignite), and Northern Alaska, containing the following coal areas—Lisburne (coal), Colville (coal and lignite), and Wainwright's Inlet (coal).

Basing their estimate on the known coal area of 1,210 square miles, and assuming 3 ft. as the minimum thickness of workable beds and 3,000 ft., 2,000 ft. and 1,000 ft. as the maximum workable depth for anthracite, bituminous coal and lignite respectively, Messrs. A. H. Brooks and G. C. Martin, of the United States

\* A Manual of Portuguese East Africa, 1920, compiled by the Geogr. Sec. of the Naval Intell. Div. Naval Staff, Admiralty, p. 274.

† Iron and Coal Trades Review (London), Vol. XCIX (1919), p. 174.

‡ Statistique de l'Industrie Minérale en France et en Algérie (1914-18).

§ Coal Resources of the World, 1913, Vol. II, pp. 541-552.

Geological Survey, arrived at a total reserve for Alaska of 19,593 million tons, distributed as follows :—

				Millions of tons.
Lignite	...	...	...	16,293
Bituminous coal	...	...	...	1,369
Anthracite	...	...	...	1,931
				<hr/>
	TOTAL	.....	...	19,593
				<hr/>

The production of coal in Alaska\* in 1918 was 67,505 tons, compared with 48,174 tons in 1917 and 2,054 tons in 1913. It is believed that a substantial coal-mining industry has at last been started in this Territory. Most of the output in 1918 came from the Matanuska field, which yielded 56,341 tons. The remainder came from eight or ten small mines in different parts of Alaska.

#### *Analyses of Coals and Lignites from Alaska.†*

	Proximate Analysis.				Sul-phur.	Calor-ific Value.
	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.		
<i>Anthracite :</i>						
Matanuska Coalfield	...	2·55	84·32	7·08	6·05	0·57
<i>Bituminous Coal :</i>						
Matanuska Coalfield	...	2·71	65·39	20·23	11·60	0·57
Bering River Coalfield	...	5·99	76·51	10·42	7·08	1·35
Cape Lisburne Coalfield	...	10·79	47·43	36·95	5·16	0·50
<i>Lignite :</i>						
Kachemak Bay Coalfield	19·85	30·99	40·48	8·67	0·35	
Bonnifield (Healy Creek)	13·02	32·40	48·81	5·77	0·16	
Alaska Peninsula :						
Chignik Bay	...	6·98	42·88	30·84	19·30	1·50
Herendeen Bay	...	7·75	32·83	50·06	9·36	0·36
Unga Island (Coal Harbour)	23·27	25·13	25·42	26·18	0·53	3,227

#### **Costa Rica.**

‡Samples of coal of good quality have from time to time been brought to San José from various parts of the country, but upon examination the seams have proved to be of no commercial value.

\* The coal production figures for Alaska are included in the total coal production of the United States.

† United States Geol. Surv. Bulletins—259 (1905), 277 and 284 (1906) 467 (1911), 501 (1912).

‡ F. N. Cox, Acting British Consul of Costa Rica.

### Guatemala.

Geological exploration has been carried on in the Republic for some time, but no true coal has yet been discovered, although bituminous lignites and peat are known to occur at many places.

\*In the following table the principal localities where lignites have been found are indicated, and analyses are given of the best lignites.

No.	Name of Mine.	Department.	Municipality.	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.
1				Per Cent.	Per Cent.	Per Cent.	Per Cent.
2	La Primera ...	Chimaltenango	Tecpan.				39·7
	Santa Rosa	Mataques-cuintla					
3	Agua Tibia ...	" "	"				
4	La Montanita	" Izabal"	Izabal	3·2	63·3	32·0	1·5
5	La Reina ...	"		15·1	39·9	34·8	10·2
6	Santa Elena ...	" Alta Vera Paz	Coban	13·4	22·1	36·2	28·3
7	Carolina del Sur						
8	Carolina del Norte	" "	"	16·8	35·1	39·0	9·1
9	San Carlos ...	Chimaltenango	San Martin J. Purulha				
10		"					

### Honduras.

The Republic of Honduras has areas of coal-bearing measures in many of its divisions. The coal deposits have never been worked, mainly because of the difficulties of transportation.

The coal of Honduras is similar to that of Guatemala, and occurs probably in Tertiary basins.

+M. de Montis estimates the possible reserve as follows :—

		Tons.
Bituminous coal ...	...	1,000,000
Lignite ...	...	4,000,000

### Mexico.‡

§The coal production of Mexico is practically all obtained from collieries in the State of Coahuila, within 100 miles of the border of Texas, U.S.A. In 1912, there were altogether nine colliery companies: namely, three American, five Mexican, and one

\* Coal Resources of the World, 1913, Vol. I., p. lxvii.

† Coal Resources of the World, 1913, Vol. I., p. lxviii; Vol. II, p. 563.

‡ Report by Department of Mines.

§ Coal Mining in Mexico, by E. O. Forster Brown; Trans. Inst. Min. Eng., Vol. XLIX, Part 2 (1915), pp. 381–421.

British. In 1913, an enormous amount of damage was done during the revolution to the surface-plant at a number of the collieries, the majority of which were closed down. E. O. Forster Brown estimates that the total coal production in Mexico in 1911 amounted to about 1,829,000 tons. The Coahuila coal occurs in the Upper Cretaceous Series, and although there are several seams, only one of them, varying from 3 to 8 feet in thickness, has justified development. Four distinct, and more or less defined, basins have been worked on an extensive scale, viz., the Sabinas, Las Esperanzas, the Saltillo-Lampacitos, and the Rio Escondido, but the major portion of the output is obtained from the first-named basin. The coal is largely converted into coke, for which there is an active market at the numerous smelting plants all over the country, treating silver, lead, and copper ores.

*Analyses of Mexican Coals and Lignites.*

No.	State.	District.	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Sul-phur.
1	Puebla and Oaxaca	Mixteca ...	Percent.	Per cent.	Per cent.	Per cent.	Per cent. [0·06]
2	Coahuila ...		1·00 2·00	73·50 57·70	5·50 20·50	20·00 9·80	
3	" ... "	Las Esper-anzas	1·40 to 3·49	34·40 39·40	36·87 to 37·35	25·64 25·55	
4	" ... "	Santo Tomas	3·20	33·90	37·35		
5	" ... "	Eagle Pass	3·67	41·70	39·42	15·20	0·81
6	" ... "	Sabinas ...		64·20	21·20	14·60	
7	" ... "	Barroteran	0·42	69·84	21·83	7·91	[0·70]
8	Del Norte ...	Ojinaga ...	0·52	49·72	21·18	28·58	[1·34]
9	Guadalajara			90 and over.		8·0-3·5	
10	" ... "	Lampacitos		67·00	17·50	15·50	

1-8. Coal Resources of the World, 1913, Vol. 2 pp. 553-559.

9. E. B. Wilson: Mines and Minerals, Vol. XXXI, pp. 257-260.

10. El Minero Mexicano, Vol. XLIV, p. 92. Journ. Iron and Steel Inst. (London), 1904, No. 1, p. 523.

*Production of Coal in Mexico.*

Year.	Quantity (long tons).
1913	...
1914	...
1915	...
1916	...
1917	...
1918	...
1919	423,896
	769,294
	716,668

**Nicaragua.**

Nicaragua has undeveloped coal resources, but no information regarding them is available.

### Panama.

\*A small quantity of lignite occurs in the province of Bocas del Toro, outcropping on the coast, and on Popa and other islands in Chiriquí lagoon. The coal-bearing areas are, in places, affected by igneous intrusion.

The best exposed seam is one apparently from 7 to 9 feet thick, occurring on the island of Popa at the entrance to Chiriquí lagoon.

The following are analyses of some of the coals :—\*

No.	Locality.	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Sulphur.
1	Island of Popa, Chiriquí, raw coal	Percent. 25·58	Per cent. 29·73	Per cent. 43·02	Per cent. 1·67	Per cent. [0·33]
2	Island of Popa, Chiriquí, briquette	4·20	44·55	47·03	4·22	[0·94]
3	Quebrada de Sierschick...	3·60	36·69	46·79	12·92	[6·36]

### Salvador.

†Coal occurs in the jurisdiction of Illobasco, on the margin of the Valley of the Friars on the River Lempa. There are indications of the occurrence of lignite in the district of Metapán, but it is of poor quality.

### Santo Domingo and Haiti.

‡A belt of brown coal occurs north-west of Maïssade, extending for more than 7 miles with an average breadth of  $3\frac{1}{4}$  miles. The best seam is 5 feet in thickness, and the quantity of coal available has been estimated at 50 million tons.

Analyses of this coal gave :—moisture, 10·05 per cent.; fixed carbon, 22·65 per cent.; volatile matter, 31·30 per cent.; ash, 20 per cent., and a calorific value of 3,825 cals.

§ Bituminous lignite occurs in the Samana district, in the eastern part of the island, in beds probably of Tertiary age, but examination has shown the seam to be thin and the material

\* Coal Resources of the World, 1913, Vol. II, pp. 565–566.

† Coal Resources of the World, 1913, Vol. I, p. lxviii.

‡ The Brown Coal of Maïssade, Haiti; Abstract, Trans. Inst. Min. Eug. (London), Vol. XXV (1902–3), pp. 771–2.

§ Coal Resources of the World, 1913, Vol. I, p. lxix.

inferior. Outcrops of lignite occur also near the towns of Macoris and Sanchez; and outcrops of coal at Arroyo Cabron, Yaniqua, and Arroyo Piedra.

### United States.\*

*Peat.*—†The United States has enormous reserves of peat, widely distributed over the country, but the output, compared with that of coal, is inconsiderable. The quantity of crude, air-dried peat produced in 1913 was 29,697 tons, the output increasing to 95,768 tons in 1918. The peat is chiefly used, and with great success, as a fertilizer in agriculture.

*Ccoal.*—The known coalfields of the United States have an area of about 310,300 square miles, not including some 160,000 square miles of which little is known at present, and about 32,000 square miles lying below a depth of 3,000 feet. The coal areas may be classified as :—(1) anthracite; and (2) bituminous, including lignite. The production of anthracite is practically confined to Pennsylvania, but that of bituminous coal (and lignite) is widely scattered, as will be seen by the following table, although 88 per cent. is produced within 1,000 miles of New York.

#### *Bituminous Coal and Lignite produced in the United States in 1918, by groups of States.‡*

	Per cent
Pennsylvania, Maryland, West Virginia and Virginia	48·8
Eastern Kentucky, Ohio and Michigan	11·8
Tennessee	1·2
Alabama	3·3
Illinois, Indiana and Western Kentucky	22·6
North and South Dakota, Iowa, Missouri, Kansas, Oklahoma, Arkansas and Texas	5·4
Colorado, Montana, Wyoming, Utah and New Mexico	6·2
Washington	0·7
TOTAL	100·0

§ The coal reserves of the United States are mostly near the surface, and new developments can be carried out quickly and without great expense.

\* Mineral Resources of the United States (Annual), U.S. Geol. Surv.

† Mineral Resources of the United States, 1918, Part II., Peat in 1918.

‡ Excluding Alaska, California, Georgia, Idaho, North Carolina, and Oregon.

§ Annales des Mines de Belgique, 1919, Vol. XX, No. 3, p. 1114.

In 1913, the United States produced 508,893,000 tons of coal, or 38½ per cent. of the estimated total production of the world, compared with 287,431,000 for the United Kingdom, and 274,264,000 for Germany. The American output consisted of 81,719,000 tons of anthracite and 427,174,000 tons of bituminous coal and lignite. During the same year, 22,141,000 tons of coal were exported, and 1,440,000 tons of coal imported, leaving for home consumption, 488,192,000 tons.

From 1913 to 1918, the production of anthracite slowly but steadily increased to 88,237,000 tons, the production of bituminous coal rapidly and steadily increased to 517,309,000 tons, and the total coal production increased to 605,546,000. During the same period the coal exports (domestic production) increased to 24,392,000 tons. It will be seen that the development of the anthracite industry has been slight compared with that of bituminous coal. The reason is to be found, primarily, in the limited reserves of anthracite as compared with the almost boundless resources of bituminous coal and, secondly, in the fact that anthracite is essentially a domestic fuel, its production following more closely the increase in population, whereas bituminous coal is the fuel of industry, and has kept pace with the industrial expansion in the country.

In 1919, chiefly owing to labour trouble, the total production of coal fell to 487,639,000 tons, or by nearly 20 per cent. compared with 1918. The rate of production recovered during 1920, and it is estimated that the total production for that year amounted to 576,500,000 tons, or within 5 per cent. of the production in 1918—the record year.

*Fuel Control in the United States.\*—*During the latter part of 1916 and the early months of 1917, due to war activities, there was a threatened shortage of coal, which resulted in panic among consumers and a rush to obtain coal at once at any price. This condition caused such a demoralization of business and so much complaint that some action to regulate prices was considered necessary by the National Administration.

In May, 1917, a Committee was appointed by the Council of National Defence, and on June 29, an agreement between the Committee and the producers was announced, fixing a tentative maximum price of bituminous coal throughout the country of 14s. per ton f.o.b. mines, to which was added 1s. 2d. for selling commission to wholesalers. This plan was based on the idea of fixing a maximum price, high enough to stimulate production, with the expectation that the law of supply and demand would, with ample production, operate so as to maintain fair and just prices for coal throughout the country. The Lever Act, approved August 10th, 1917, was described as “An Act to provide further for the national

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\* Prices of Coal and Coke, 1913–1918, by C. E. Lesher; U.S. Geological Survey, Mineral Resources of the United States.

security and defence by encouraging the production, conserving the supply, and controlling the distribution of food products and fuel." Section 5 authorized the licensing of "the importation, manufacture, storage, mining or distribution of any necessities," and Section 25 gave authority "to fix the price of coal and coke whenever and wherever sold, either by producer or dealer."

On August 21st, 1917, the President announced prices for bituminous coal throughout the United States, specifying prices for run-of-mine, prepared sizes, and slack or screenings, by States and, in a few instances, by districts or by seams.

On August 23rd, 1917, H. A. Garfield was appointed United States Fuel Administrator, and on the same date the President fixed prices for anthracite.

The following is a summary of the changes in the prices of bituminous coal. The average spot price, pre-war period, was 5s. 11·12d. per ton, and the average realized price was 5s. 5·52d. There was a downward trend of the price in 1913, 1914 and 1915, from a general average spot price of 6s. 10·32d. in January, 1913, to 5s. 3·84d. in July, 1915. The strength of the demand in the winter of 1915-16, particularly manifested in the Eastern States, was marked by a rise in the general average spot price to 7s. 2·24d., the highest point reached being 17s. 7·12d. in June, 1917. The Peabody prices effected a reduction to 13s. 10·88d. in July, 1917. A further decrease in the general level of prices to 9s. 10·72d. in September was brought about by the President's prices of August 21st, 1917. The effect upon prices of the wages advance in November, 1917, was to raise the average spot price to 12s. 0·48d. The advances in prices in the various coalfields, authorized by the Fuel Administrator as the result of investigations into the cost of mining, raised the general level gradually to 12s. 7·76d. in August, 1918, which was the maximum fixed by Government control in May, 1918. The general reduction of 5·6d. per ton brought the price to 12s. 4·96d. in June, 1918.

\*The coal industry, after suffering from scarcity of fuel during the war has, since the Armistice, entered a period of over-production, and the probable result will be the fostering of coal exports in order to find an outlet. During the war the export trade was very little developed. The export of anthracite to Canada was maintained at from 3 to 4 million tons per annum, while that of bituminous coal fell from 12 million tons in 1913 to 8 million tons in 1915, but increased to over 16 million tons in 1918. Exports to Mexico and Central America continued at the rate of about 2½ million tons per annum, but those to South America increased from about half-a-million to nearly 1½ million

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\* Survey of the Mining and Metallurgical Industry in Foreign Countries in 1913 and during the war, by A. Delmer; Annales des Mines de Belgique, 1919, Vol. 20, No. 3.

tons. The export of coal to the Mediterranean exceeded 3 million tons in 1915, but fell to about  $1\frac{1}{4}$  million tons in 1916, and to about  $\frac{1}{2}$  million tons in 1918. However, during the 12 months ended December 31st, 1919, the exports rose again to nearly 3 million tons.

\*The despatches of coal during the war to Spain, France and Scandinavia were of importance only in 1915.

\*The United States did not develop her coal export industry during the war for three reasons; firstly, on account of the increased local demand; secondly, on account of the large requirements of coal made by the navy; and, thirdly, because of the increased freights to Europe, caused by the submarine warfare. The coal areas of Pocahontas and New River, which are situated about 400 miles and 340 miles respectively from Hampton Roads, supply, almost exclusively, the coal export trade.

*Coke.*—In 1919, the total coal production of the United States was 39,994,591 tons, compared with 41,338,866 tons in 1913. The coke produced at by-product ovens in 1919 was 22,449,591 tons, compared with 11,352,411 tons in 1913; while the coke produced at beehive ovens in 1919 was 17,545,000 tons, compared with 29,986,455 tons in 1913.

*Manufactured Fuel.*—The production of fuel briquettes made rapid progress during the period under consideration, especially in 1917 and 1918, increasing from 162,374 tons in 1913 to 426,103 tons in 1918.

*Production of Peat in the United States.*

Year.	Fertilizer and fertilizer ingredient.		Stock food.		Fuel.		Other products.†		Total.
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).	
1913	...	...	25,411	34,854	4,286	5,672	—	10,944	40,526
1914	...	...	33,687	51,356	4	—	—	—	63,644
1915	...	...	34,200	54,639	3,564	6,362	—	—	61,001
1916	...	...	42,952	70,441	3,889	6,761	—	—	77,380
1917	...	...	82,378	138,224	4,564	10,789	—	—	149,013
1918	...	...	71,047	162,676	6,336	22,437	18,363	22	219,732
1919	...	...	48,830	126,963	5,716	22,543	—	11,244	160,750
							7,237	—	61,783

\* Values converted to £ sterling at the average rate of exchange for each year.

† Figures not available.

† Peat moss, paper stock and packing material.

*Imports of Peat Moss to the United States.*

Year.	Quantity (long tons).			Value. (£).
1913	...	...	...	9,806 11,451
1914	...	...	...	8,858 11,825
1915	...	...	...	6,709 10,178
1916	...	...	...	2,716 5,840
1917	...	...	...	452 1,042
1918	...	...	...	— —
1919	...	...	...	414 3,724

\* Values converted to £ sterling at the average rate of exchange for each year.

*Coal Resources of the United States.†*

	Area in Square Miles.			Estimated Original Amount of Coal (in millions of tons).				Total pro- duction of Coal to end of 1910 (in mil- lions of tons). ‡
	Known Coalfield	Possible Coalfield	Coal below a depth of 3,000 ft.	Lignite.	Bitu- minous.	Anthra- cite and Anthra- citic.	Coal below surface from 3,000 to 6,000 ft.	
Eastern Province ...	69,965	82	—	—	499,908	19,873	—	5,586·4
Interior Province ...	132,900	6,800	—	—	480,490	363	—	1,499·3
Gulf Province ...	2,100	58,900	—	20,953	—	—	—	—
Northern Gt. Plains Province.	88,590	20,307	80	1,134,026	41,336	—	—	163·4
Rocky Mountain Province.	37,432	3,223	28,390	648,696	325,871	463	—	140·4
Pacific Coast Province.	1,900	170	—	48,511	10,380	21·1	—	55·4
TOTAL ...	382,887	89,482	28,470	1,847,186	1,857,485	20,720·1	604,900	7,480·3
	Fifty per cent. added for waste ...							3,740·2
	Estimated amount exhausted ...							11,220·5

† Coal Resources of the World, 1913, Vol. II, p. 539.

‡ Since 1910 to the end of 1919, the total production of coal was 4,563·5 million tons. Adding 50 per cent. for waste, and then adding the result to the 11,220·5 million tons brings the estimated amount of coal exhausted to 18,065·7 million tons.

*Analyses of United States Coals.*

State.	County.	Mine.	Name.	Size of coal.	Dry coal.			Coal as received.	Dry Coal.	No. of analyses averaged.
					Moisture.	Fixed Carbon.	Proximate analysis.			
Alabama	Bibb	Blockton	Thompson	Lump	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	11
		Marvel, Nos. 1 and 2.	Clark and Ghollson	Mixed sizes and washed	2.29	57.86	36.32	0.73	7.636	7,876
	Jefferson	Pratt	Pratt	Run-of-mine	3.75	55.18	33.98	1.17	7.280	7,512
Arkansas and Oklahoma	Tuscaloosa	Gilmore	Brookwood	Anthracite, through	1.98	62.26	30.24	1.26	7.807	7,966
	Gumison	Floresta	Ruby	Run-of-mine	6.96	52.72	35.04	1.01	6.786	7,262
	Las Animas	Green Canon	...	3 in. over 3 in. mesh.	3.62	78.57	4.86	0.31	6.570	6,817
	"	Primrose	...	Run-of-mine	1.47	56.03	30.91	1.36	7.267	7,376
Georgia	Durham	Durham	...	Lump over 1 1/4 in. round holes.	3.22	51.72	38.51	0.46	7.072	7,308
Illinois	No. 6	No. 6	...	Run-of-mine	2.76	73.89	20.38	5.78	1.06	7,980
	North	...	...	...	7.90	53.45	36.08	10.47	0.80	6,699
	Mission Field, Nos. 1, 2 and 3.	Mission Field, Nos. 1, 2 and 3.	...	Run-of-mine	11.61	44.41	41.62	13.97	2.94	7,166
	John Bull	No. 5	...	Run-of-mine	10.75	44.10	43.15	12.17	6.212	6,960
Indiana	Warwick	...	...	Run-of-mine	4.41	61.24	30.33	18.43	4.24	6,497
Kansas	Cherokee	Home-Riverside	Nos. 1 and 2	Run-of-mine	7.41	44.20	41.19	14.61	5.00	6,342
	Leavenworth	Blanche	Straight Creek	Run-of-Mine	2.86	58.09	37.93	8.98	1.08	6,852
Kentucky	Bell	No. 7	No. 12	Run-of-Mine	4.65	52.65	36.60	10.85	1.58	7,888
Iowa	Monroe	Snoky Hollow	...	Run-of-mine	13.24	38.68	40.45	20.87	5.35	6,974
Maryland	Allegany	Consolidation	Pittsburgh or Big Vein	Run-of-mine	1.54	72.87	18.29	8.84	0.93	7,769
	Garrett	Dodson	B. or Lower	Run-of-mine	1.50	68.46	16.60	14.94	2.28	7,199
Michigan	Saginaw	Riverside	Kittanning	Lump over 1 in. screen	10.30	50.47	37.08	12.45	2.06	6,366
Missouri	Macon	Nos. 8 & 9	Saginaw	Run-of-mine	13.69	40.43	36.11	25.46	3.67	5,197
	Carroll	Bear Creek	Bever	Run-of-mine	9.37	46.61	48.64	9.75	6,022	6,827
	"	Nos. 2 & 3.	Nos. 2 & 3.	Run over 2 in. screen	9.73	49.06	41.53	9.41	1.54	6,141
Montana	Cascade	Sand Coulee	...	Run over 2 in. screen	5.50	52.56	29.23	18.21	2.50	5,926

New Mexico ...	Colfax ..	Koehler ...	Raton ...	" ...	Lump over 1 $\frac{1}{2}$ in. screen	1.69	68.96	38.52	7.52	0.71	7.649	7.782
Santa Fe ..	No. 4 ..	" ...	" ...	" " " "	" Anthracite egg	1.83	50.22	37.56	12.22	0.70	7.184	7.318
U.S. Reclamation Service	North Dakota ...	Lignite ...	Crushed ...	"	Crushed	4.87	82.53	5.89	11.58	0.74	6.914	7.268
Ohio ...	Athens ..	Hocking ...	Lump ...	"	"	40.95	42.03	47.08	10.89	1.37	3.587	5.390
Oklahoma ...	Le Flore, Pitts- burg and Lat- mer.	Longsheat ...	Stalter No. 1 ...	"	Run-of-mine	6.30	48.80	41.10	10.60	3.48	6.738	7.191
Pennsylvania ...	Cambria ...	Howe ...	"	"	Lump over 1 $\frac{1}{2}$ in. screen	4.98	68.27	18.97	12.76	0.98	7.139	7.514
Clearfield ...	Brigh No. 4 ..	Greenwich ...	D. or Lower Freeport.	"	Run-of-mine	2.14	51.95	38.80	9.25	0.95	7.298	7.458
Somerset ...	Pine Hill and Elk Lick	Pittsburgh ...	"	"	"	3.14	64.98	26.37	8.64	1.45	7.660	7.908
Washington ...	Diamond ...	"	"	"	Lump over 2 $\frac{1}{2}$ in. screen	3.60	78.02	16.44	5.54	0.64	7.929	8.226
Tennessee ...	Clairborne ..	King Mtn.	Jellico ...	"	Run-of-mine	2.00	50.86	35.40	13.74	1.99	7.041	7.186
Texas ...	Sequatchie ..	Dunlap ..	Sewanee ...	"	"	2.05	58.91	30.96	10.13	1.26	7.484	7.641
Utah ...	Maverick Webb ...	International Cannel ...	Eagle Pass ...	"	Lump	7.10	47.02	37.73	15.25	1.00	6.291	6.771
Virginia ...	Tazewell ...	San José and No. 3	San Pedro ...	"	Run-of-mine	4.45	36.88	42.64	20.68	2.87	6.049	6.381
Washington ...	King ..	Black Hawk ...	Book Cliff ...	"	Lump	4.57	46.88	46.76	6.86	0.61	7.214	7.559
West Virginia ...	Fayette ...	"	Aberdeen ...	"	Lump over 4 in. screen	4.94	51.32	42.39	6.29	0.58	7.048	7.414
Harrison ...	McDowell ...	Big vein Nos. 1 and 2	Pocahontas No. 3	"	Run-of-mine	3.12	74.94	20.08	4.98	0.67	8.087	8.348
Wyo ming ...	Mingo ...	Nos. 2, 5, 6, 52 and 55	Upper and Lower Banner	No. 4 ...	Run-of-mine (steam)	2.22	54.41	36.94	8.66	0.70	7.609	7.782
Wyoming ...	Raleigh & Fayette	Newcastle ...	Gale Creek ...	"	Lump over 2 in. screen	11.88	43.54	42.26	14.20	0.64	5.732	6.504
		Dun Loop, Pruden- ce and Scar- borough	Hutchinson ...	"	Washed through $\frac{1}{2}$ in. round hole screen	2.80	53.26	35.41	11.23	0.93	7.369	7.681
		Jed and Leckie ...	Pittsburgh ...	"	Run-of-mine	2.04	75.70	18.14	6.16	0.72	8.004	8.171
		Buffalo ...	Pocahontas No. 3	"	Nut, pea, and slack	3.51	52.73	35.17	12.04	0.76	7.077	7.334
		Various minces	Winifred ...	"	Run-of-mine	3.26	76.51	17.89	5.60	0.78	7.971	8.239
		No. 5 ...	Sewell ...	"	Nut, pea and slack	4.75	52.31	34.37	13.32	0.99	6.842	7.183
		Kooi ...	Willow Creek ...	"	Run-of-mine	3.10	78.82	16.63	4.56	0.58	8.073	8.332
		Sheridan	Monarch ...	"	Lump	22.20	41.83	52.52	5.60	0.53	5.334	6.857

Reference.

Analyses of coals purchased by the Government during the fiscal years 1908-1915, by G. S. Pope, U.S. Bureau of Mines, Bull. 119, 1916.

*Production of Coal in the United States.*

Year.	Quantity (long tons).			Value* (£).		
	Anthracite.	Bituminous.	Total.	Anthracite.	Bituminous.	Total.
1913 ...	81,718,680	427,174,372	508,893,052	40,111,206	116,160,080	156,271,286
1914 ...	81,090,631	379,414,259	458,504,890	38,672,708	101,378,800	140,051,508
1915 ...	79,459,876	395,200,380	474,660,256	39,038,795	106,139,046	145,177,841
1916 ...	78,195,083	448,678,287	526,873,370	42,350,013	139,137,333	181,787,346
1917 ...	88,939,117	492,670,145	581,609,262	59,640,454	262,231,914	321,772,368
1918 ...	88,237,575	517,308,767	605,546,342	70,600,157	313,010,898	383,611,055
1919 ...	78,653,751	408,985,000†	487,639,000†	83,145,808	266,600,000†	349,700,000†

\* Values converted to £ sterling at the average rate of exchange for each year.

† Estimated.

*Coal Mined by Machines in the United States.*

Year.	Anthracite.		Bituminous.	
	Quantity (long tons).	No. of Machines.	Quantity (long tons).	No. of Machines.
1913 ...	496,229	16,379	216,447,958	
1914 ...	818,389	16,507	194,999,363	
1915 ...	1,167,639	15,692	217,176,385	
1916 ...	1,642,416	16,198	253,295,960	
1917 ...	1,745,735	17,235	273,567,970	
1918 ...	1,658,495	18,463	289,224,226	
1919 ...	...			

*Coal obtained from Steam-shovel Strip Pits in the United States.*

Year.	Number of shovels.			Quantity of coal mined (long tons).		
	Bitu- minous.	Anthra- cite.	Total.	Bitu- minous.	Anthra- cite.	Total.
1915* ...	87	57	144	2,528,231	1,001,431	3,529,662
1916† ...	111	105	216	3,511,067	1,774,821	5,285,888
1917 ...	182	76	258	5,169,623	2,054,989	7,224,612
1918 ...	276	82	358	7,400,219	2,107,306	9,507,525
1919 ...	...					

\* Excluding Alabama, where only 1 steam shovel was in use, and the extent of its operations cannot be revealed.

† Excluding West Virginia, where only 1 steam shovel was in use, and the extent of its operations cannot be revealed.

*Bituminous Coal washed at the Mines in the United States.*

Year.	Material washed (long tons).	Coal recovered (long tons).	Refuse (long tons).
1913 ...	22,367,679	19,705,081	2,662,598
1914 ...	20,400,578	18,092,983	2,307,595
1915 ...	20,957,175	18,637,256	2,319,919
1916 ...	22,886,584	20,466,266	2,420,318
1917 ...	25,524,229	22,753,300	2,770,929
1918 ...	22,428,168	19,658,297	2,769,871
1919 ...	...		

*Disposition of Coal produced in the United States*  
(long tons).

	1913.			1914.			1915.			1916.		
	Bituminous.	Anthracite.	Total.									
Loaded at mines for shipment.	360,299,148	71,343,172	431,652,320	325,451,142	70,464,046	395,915,188	339,175,527	68,666,456	407,841,983	378,273,826	67,501,362	445,775,188
Sold to local trade and used by employees.	12,385,561	1,793,814	14,179,375	11,573,732	1,919,533	13,493,266	11,080,096	1,867,984	12,898,080	14,136,279	1,978,649	16,114,928
Used at mines for steam and heat.	10,430,449	8,681,694	19,002,143	9,326,406	8,707,052	18,032,458	8,748,823	8,925,486	17,674,369	9,205,771	8,715,072	17,920,843
Made into coke at mines	44,159,214	—	44,159,214	31,063,979	—	31,063,979	36,945,934	—	36,245,934	47,062,411	—	47,062,411
<b>TOTAL ...</b>	<b>427,174,372</b>	<b>81,718,680</b>	<b>508,893,052</b>	<b>377,414,259</b>	<b>81,090,651</b>	<b>458,504,890</b>	<b>395,200,380</b>	<b>79,159,876</b>	<b>474,660,256</b>	<b>448,678,287</b>	<b>78,195,083</b>	<b>526,873,370</b>
	1917.			1918.			1919.					
	Bituminous.	Anthracite.	Total.									
Loaded at mines for shipment ...	419,509,799	77,490,043	496,999,842	449,186,186	76,721,167	625,907,342	—	—	—	67,972,295	—	67,972,295
Sold to local trade and used by employees ...	17,417,252	2,124,109	19,544,361	16,680,140	2,387,892	19,068,032	—	—	—	2,107,876	—	2,107,876
Used at mines for steam and heat ...	10,818,892	9,382,966	20,140,857	11,119,863	9,125,266	20,308,389	—	—	—	8,573,580	—	8,573,580
Made into coke at mines ...	44,394,202	—	44,924,202	40,262,579	—	40,262,579	—	—	—	—	—	—
<b>TOTAL ...</b>	<b>492,570,145</b>	<b>88,938,117</b>	<b>581,609,262</b>	<b>517,808,767</b>	<b>88,237,575</b>	<b>605,546,342</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>78,653,751</b>	<b>—</b>	<b>78,653,751</b>

*Exports of Coal from the United States.*

Year.	Quantity (long tons).			Value* (£).		
	Anthracite.	Bituminous.	Total.	Anthracite.	Bituminous.	Total.
1913 ...	... 4,154,386	17,986,757	22,141,143	4,512,916	9,340,252	13,853,168
1914 ...	... 3,850,244	13,801,850	17,632,084	4,133,529	7,008,817	11,162,346
1915 ...	... 3,540,406	16,764,857	20,305,263	3,895,248	9,052,242	12,948,540
1916 ...	... 4,165,652	18,977,345	23,142,997	4,710,723	9,607,566	14,318,289
1917 ...	... 5,393,666	21,285,320	26,648,986	6,488,203	16,688,214	23,176,417
1918 ...	... 4,435,543	19,956,009	24,391,552	6,130,023	16,508,425	22,635,448
1919 ...	... 4,443,391	17,958,514	22,401,905	8,354,552	19,072,418	27,426,970

\* Values converted to £ sterling at the average rate of exchange for each year.

*Exports of Bituminous Coal from the United States (Domestic Produce)*  
(long tons).

(long tons).

To	Fiscal years ending June 30.						July 1 to December 31, 1918.	Calendar years.	
	1913.	1914.	1915.	1916.	1917.	1918.		1918.	1919.
United Kingdom ...	...	...	...	...	...	...	4,449	45,989	6,588
Gibraltar ...	...	...	5,320	20	2,261	—	—	800	20,291
British East Africa	...	...	—	11,380	32,578	1,113	—	—	6,174
British South Africa	...	...	—	—	10,950	—	2,084	—	4,159
British South Africa	...	...	6,201	—	3,742	—	—	—	—
Egypt ...	...	...	96,627	73,785	139,606	102,591	63,679	—	37,543
British Guiana	...	...	11,1200	16,054	25,406	18,062	3,064	1,965	3,746
Canada ...	...	...	11,981,443	11,472,397	8,425,103	10,493,111	12,991,523	16,191,364	10,663,490
Falkland Islands ...	...	...	—	—	—	—	—	8,906	15,208
Newfoundland and Labrador	...	...	26,683	20,476	4,015	7,861	10,338	1,941	4,207
British West Indies	...	...	347,190	352,095	284,593	391,836	1,523	168,711	230,119
British India ...	...	...	—	—	3,013	—	198,477	—	—
British Oceania ...	...	...	—	65	10	—	276	—	50,039
Total to British Possessions ...	12,474,664	11,946,172	8,931,277	11,019,023	13,389,489	16,956,275	9,678,102	16,379,661	11,047,564
Austria-Hungary ...	...	...	...	...	...	...	—	—	212
Azores and Madeira	...	...	64,754	39,952	5,728	9,545	11,631	—	32,856
Belgium ...	...	...	—	—	—	—	—	—	200
Denmark ...	...	...	—	—	—	—	—	—	88,903
France ...	...	...	16,149	47,332	50,620	2,677	121,123	10	523,243
Germany ...	...	...	6,730	5,123	180,039	—	20,116	1,128	8,540
Greece ...	...	...	—	—	101,783	87,778	18,356	2,894	48,120



Guatemala ...	17,646	15,858	15,463	20,396	1,362	231	3,893
Haiti ...	...	8,488	2,228	1,397	4	226	—
Honduras ...	...	6,846	13,759	18,577	15,069	2,006	903
Mexico ...	...	43,884	236,392	39,611	205,809	7,307	8,357
Nicaragua ...	...	1,042	1,617	1,271	1,755	191,740	101,679
Panama ...	...	483,974	362,427	343,372	473,183	2,470	2,026
Salvador ...	...	...	45	—	22	520,760	504,129
Argentina ...	...	38,834	139,409	563,889	779,846	611,413	72,097
Bolivia ...	...	—	—	—	—	233,586	2,243
Brazil ...	...	234,368	239,082	527,264	1,007	61,434	483,389
Chile ...	...	112,067	83,876	67,781	151,528	—	—
Colombia ...	...	3,958	3,584	2,610	5,221	3,193	—
Dutch Guiana ...	...	5,485	5,325	2,712	5,909	9,186	—
Ecuador ...	...	18,305	22,571	—	18,741	1,703	—
French Guiana ...	...	191	280	—	19,253	8,645	—
Peru ...	...	9,209	96	4,430	20,964	—	—
Uruguay ...	...	4,400	62,452	103,639	154,334	25,376	10
Venezuela ...	...	3,351	5,733	8,653	6,757	99,899	628,750
Japan ...	...	—	—	5,559	—	3,585	559,099
Philippine Islands ...	...	53,353	45,987	36,837	—	109,178	300,062
Russia-in-Asia ...	...	—	—	—	—	101,959	93,618
Dutch East Indies ...	...	—	—	8,014	16,152	161,464	11,835
German Oceania ...	...	—	—	—	—	2,158	—
Total to Foreign Countries...	...	3,608,437	3,758,794	5,481,718	7,730,661	6,294,616	4,095,704
TOTAL	...	16,083,101	15,704,966	14,412,995	18,749,684	19,534,105	21,051,979
Europe ...	...	475,713	323,261	2,061,280	3,594,281	1,635,902	355,314
North America ...	...	14,877,291	13,937,550	10,756,199	13,062,947	15,680,254	17,640
South America ...	...	441,368	578,462	1,297,291	1,840,128	2,039,448	43,360
Asia...;	...	—	—	—	16,152	1,367,489	10,634,113
Oceania ...	...	53,353	—	46,052	36,847	7,930	18,567,512
Africa ...	...	235,376	219,641	236,176	244,792	379	1,308,428
						134	—
						3	13,224
						—	1,487,166
						—	50,040
						37	16,672
						1	168,522

*Exports of Anthracite Coal from the United States (Domestic Produce)*

(long tons).

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To	Fiscal years ending June 30.						July 1 to December 31, 1918.	1918.	1919.
	1913.	1914.	1915.	1916.	1917.	1918.			
United Kingdom ...	...	...	66	—	1	370	—	1,658	—
Malta, Gozo, etc ...	...	...	—	—	—	242	—	—	220
British West Africa	...	...	—	—	—	1,335	—	20	—
British South Africa	...	...	—	—	102	—	—	—	—
British Guiana ...	...	...	4,545,976	3,897,365	3,621,234	3,749,529	4,547,319	4,762,635	—
Canada ...	...	...	7,072	19,251	7,825	29,508	13,047	8,346	4,379,177
Newfoundland and Labrador	...	...	8,027	2,767	4,669	4,185	4,236	2,131	6,632
British West Indies	...	...	—	—	43	—	1	87	1,818
British Oceania ...	...	...	—	—	—	—	—	—	—
Total to British Possessions ...	4,561,141	3,919,383	3,633,772	3,778,271	4,564,627	4,774,789	2,413,844	4,387,847	4,360,480
Austria-Hungary ...	...	...	—	—	—	—	—	—	185
Belgium ...	...	...	2	—	—	—	—	25	—
Denmark ...	...	...	—	—	—	85	—	—	—
France ...	...	...	—	—	26	170	84	—	—
Germany ...	...	...	—	—	—	—	1,742	—	—
Greece ...	...	...	—	—	—	2,084	—	—	—
Iceland and Faroe Islands	...	...	—	—	—	—	13	—	—
Italy ...	...	...	—	—	15	—	18	—	—
Netherlands ...	...	...	—	—	—	35,660	133	352	260
Norway ...	...	...	—	—	—	—	—	—	—
Portugal ...	...	...	—	—	—	—	101	5	—
Spain ...	...	...	—	—	—	—	—	260	—
Sweden ...	...	...	—	—	—	—	—	—	—
Turkey ...	...	...	—	—	—	—	—	—	—
Portuguese Africa ...	...	...	—	—	—	—	—	—	—
Azores and Madeira Islands ...	—	—	—	—	—	—	—	1	3
	18	—	—	—	11	—	—	—	—



*Imports of Coal into the United States.*

Year.	Quantity (long tons).			Value* (£).		
	Anthracite.	Bituminous.	Total.	Anthracite.	Bituminous.	Total.
1913 ...	... 921	1,438,856	1,439,777	1,171	792,604	793,775
1914 ...	... 19,347	1,376,315	7,809	7,809	79,388	807,197
1915 ...	... 2,997	1,521,237	3,155	929,889	988,351	933,054
1916 ...	... 5,693	1,530,212	4,049	988,351	1,005,530	992,400
1917 ...	... 11,187	1,293,262	9,766	1,005,530	1,016,996	1,016,996
1918 ...	... 33,279	1,300,958	42,884	1,404,549	1,447,433	1,447,433
1919 ...	... 73,945	903,170	977,115	1,129,976	1,247,005	1,247,005

\* Values converted to £ sterling at the average rate of exchange for each year.

*Coke produced in the United States.*

Year.	By product coke.			Beehive Coke.			Total.		
	Quantity (long tons).	Percentage of total.	Value* (£).	Quantity (long tons).	Percentage of total.	Value* (£).	Quantity of total.	Percentage of total.	Value* (£).
1913 ...	11,352,411	27.5	9,995,448	37.7	29,986,455	72.5	16,499,059	62.3	41,338,866
1914 ...	10,017,806	32.5	7,825,764	43.1	20,835,689	67.5	10,327,589	56.9	30,853,495
1915 ...	12,556,085	33.8	10,266,031	46.0	24,660,942	66.2	12,059,227	54.0	37,126,027
1916 ...	17,026,215	45.0	15,801,482	44.1	31,664,486	65.0	20,014,283	55.9	48,690,701
1917 ...	20,035,072	40.4	29,102,257	46.5	29,613,882	59.6	33,501,231	53.5	55,815,765
1918 ...	23,212,125	46.0	40,499,116	50.5	27,214,993	54.0	39,720,013	49.5	62,603,488
1919 ...	22,449,591	56.1	36,487,534	43.9	17,545,000	43.9	50,427,118	49.5	80,219,129
							39,945,591		39,945,591

\* Values converted to £ sterling at the average rate of exchange for each year.

*Imports and Exports of Coke into and from the United States.*

Year.	Imports.		Exports.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ..	93,105	90,976	881,603	680,216
1914 ... ..	120,777	114,169	592,487	459,039
1915 ... ..	47,520	47,015	799,562	653,805
1916 ... ..	49,067	52,309	1,048,789	880,972
1917 ... ..	22,206	30,741	1,258,321	1,793,398
1918 ... ..	26,936	46,555	1,506,986	2,488,755
1919 ... ..	14,720	32,047	640,139	1,168,403

\* Values converted to £ sterling at the average rate of exchange for each year.

*Manufacture of Coke in the United States.*

Year.	In Operation.		Coal used (long tons).	Percentage yield of coke from coal.	Coke produced (long tons).	Total value of coke at ovens* (£).
	Establish- ments.	Ovens.				
1913 ...	444	72,008	61,820,705	66·9	41,338,866	26,494,507
1914 ...	359	54,638	46,092,634	66·9	30,853,495	18,153,353
1915 ...	354	54,967	55,207,945	67·2	37,126,027	22,305,258
1916 ...	389	72,888	72,865,589	66·8	48,690,701	35,815,765
1917 ...	398	75,985	74,778,903	66·4	49,648,954	62,603,488
1918 ...	403	70,221	75,917,873	66·4	50,427,118	80,219,129
1919 ...			59,688,767	67·0	39,994,591	

\* Values converted to £ sterling at the average rate of exchange for each year.

*Number of Beehive and By-product Coke Ovens in United States  
at end of each Year.*

Year	Beehive Coke Ovens.	By-product Coke Ovens.
1913 ...	96,962	5,688
1914 ...	93,946	5,809
1915 ...	93,110	6,268
1916 ...	91,581	7,283
1917 ...	88,027	7,869
1918 ...	84,635	9,279
1919 ...	...	10,379

*By-product ovens built and building in the United States.*

Year.	Number and type of ovens built.							Number of ovens building.			
	Koppers.	United Ottio.*	Semet- Solvay.	Roth- berg.	Didier.	Gas Machinery.	Klönné.	Wil- putte.	Roberts fuelless	Roberts mass.	Total.
913	...	1,361	2,186	1,537	281	300	—	22	—	1	5,688
914	...	1,669	1,957	1,538	281	232	27	27	18	—	5,809
915	...	2,104	1,957	1,689	281	150	30	27	18	12	6,268
916	...	2,972	1,996	1,743	281	150	60	27	18	—	7,283
917	...	3,374	2,032	1,831	281	150	60	27	18	—	7,869
918	...	4,829	1,840	2,035	281	90	60	42	78	36	9,279
919	...	...	...	...	...	...	...	...	...	24	10,379

\* Includes the Otto-Hoffmann and Schniewind types.

*Coal used in the manufacture of Coke in the United States.*

*Exports of Coke from the United States (Domestic produce)*  
(long tons).

To	Fiscal years ending June 30.						July 1 to December 31, 1918.	1918.	1919.	Calendar years.
	1913.	1914.	1915.	1916.	1917.	1918.				
Russia .....	..	..	..	..	..	..	—	—	—	—
Spain .....	..	..	..	..	..	..	—	—	—	1,611
Sweden .....	..	..	..	..	..	..	—	—	—	6,712
Switzerland .....	..	..	..	..	..	..	—	—	—	60
Costa Rica .....	..	..	..	..	..	..	—	—	—	6,140
Honduras .....	..	..	..	..	..	..	—	—	—	5
Danish West Indies .....	..	..	..	..	..	..	—	—	—	—
Dutch West Indies .....	..	..	..	..	..	..	—	—	—	—
Dominican Republic .....	..	..	..	..	..	..	—	—	—	—
French West Indies .....	..	..	..	..	..	..	—	—	—	—
Huatemala .....	..	..	..	..	..	..	—	—	—	—
Haiti .....	..	..	..	..	..	..	—	—	—	—
Honduras .....	..	..	..	..	..	..	—	—	—	—
Mexico .....	..	..	..	..	..	..	—	—	—	—
Nicaragua .....	..	..	..	..	..	..	—	—	—	—
Panama .....	..	..	..	..	..	..	—	—	—	—
Salvador .....	..	..	..	..	..	..	—	—	—	—
Santiago, Chile .....	..	..	..	..	..	..	—	—	—	—
Argentina .....	..	..	..	..	..	..	—	—	—	—
Bolivia .....	..	..	..	..	..	..	—	—	—	—
Brazil .....	..	..	..	..	..	..	—	—	—	—
Chile .....	..	..	..	..	..	..	—	—	—	—
Colombia .....	..	..	..	..	..	..	—	—	—	—
Ecuador .....	..	..	..	..	..	..	—	—	—	—
Paraguay .....	..	..	..	..	..	..	—	—	—	4

Peru	...	...	...	...	...	...	6,774	8,887	36,443	16,571	11,372	16,648	20,519
Uruguay	...	...	...	...	...	—	—	605	223	42	55	75	18
Venezuela	...	...	...	...	...	46	115	45	1,360	1,981	47	33	1,609
China	...	...	...	...	...	—	—	—	—	—	—	—	30
Japan	...	...	...	...	...	—	—	12	—	—	—	—	—
Philippine Islands	...	...	...	...	...	—	150	—	—	—	145	70	198
Russia-in-Asia	...	...	...	...	...	40	—	60	—	—	—	—	—
Dutch East Indies	...	...	...	...	...	—	—	334	—	825	3	—	100
French Oceania	...	...	...	...	...	—	—	2,348	—	—	—	—	—
Total to Foreign Countries	...	...	219,883	192,573	149,573	294,738	383,670	392,723	214,450	435,402	402	288,549	288,549
TOTAL	...	...	900,672	742,476	602,473	976,398	1,170,834	1,357,321	768,337	1,506,986	1,506,986	640,139	640,139
Europe	...	...	31,964	26,502	6,627	50,945	38,051	17,010	2,919	7,956	34,700	34,700	34,700
North America	...	...	866,214	715,617	571,782	860,944	988,054	1,238,955	713,159	1,406,655	542,524	542,524	542,524
South America	...	...	2,454	207	21,554	64,103	143,902	81,193	52,189	92,290	62,564	62,564	62,564
Asia:	...	...	—	—	12	394	825	3	—	—	—	—	—
Oceania	...	...	40	150	2,498	12	—	145	70	70	70	70	130
Africa	...	...	—	—	—	—	2	15	—	15	15	15	23

*Production of Fuel Briquettes in the United States.*

Year.			Quantity (long tons).	Value* (£).
1913	...	...	162,374	207,013
1914	...	...	223,781	237,295
1915	...	...	197,801	218,967
1916	...	...	263,531	303,074
1917	...	...	363,264	468,910
1918	...	...	426,103	674,107
1919	...	...	264,048	524,278

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Values converted to £ sterling at the average rate of exchange for each year

*By-products obtained from Coke-oven operations in the United States.*

		1913.	1914.	1915.	1916.	1917.	1918.	1919.
Tar	...	...	...	...	gallons	115,145,025	109,901,315	138,414,601
Ammonia—	...	...	...	...	pounds	173,342,349	170,763,906	199,900,487
Sulphate	...	...	...	...	gallons	4,102,448	5,938,233	10,626,612
Liquor	...	...	...	...	gallons	28,663,936	25,370,509	30,002,196
Anhydrous or Free Ammonia*	...	...	...	...	pounds	64,553,941	61,364,375	213,667,614
Gas	...	...	...	...	thousand cu. ft.			
Benzol products—								
Crude Light Oils	...	...	...	...	gallons	13,082,678	16,572,544	7,516,695
Secondary Light Oils	...	...	...	...	"	182,039	767,373	326,540
Benzol	...	...	...	...	"	2,516,483	21,079,500	36,804,228
Toluol	...	...	...	...	"	623,506	3,939,636	7,395,174
Solvent Naphtha	...	...	...	...	"	196,151	1,350,726	2,115,516
Other Oils	...	...	...	...	"			
Naphthaline	...	...	...	...	pounds			
Coke Breeze	...	...	...	...	long tons	82,939	204,893	465,865
Other Products†	...	...	...	...	£\$			
						80,231	30,062	1,335,308
								266,021
								368,516
								146,991

NOTE:—Figures showing production of Tar and Ammonia during the years 1915 to 1917 not being available, the quantity sold has been given for these years.

\* Including liquor and sulphate sold on pound basis of NH<sub>3</sub>.

† Not available.

‡ In 1913 the sales consisted mainly of Benzol, but in other years the term "other products" included.—Retort carbon and residue, domestic coke and coke dust, aniline oil, sodium ferrocyanide, drip oil, spent oxide, pyridin oil, coal-tar paint, wash oil, sodium prussiate, extil covering, crude heavy solvent, ammonium chloride and xylool. Detailed particulars are not available.

§ Values converted to £ sterling at the average rate of exchange for each year.

## FOREIGN SOUTH AMERICA.

**Argentina.\***

Deposits of coal are said to occur in the district of San Julian, in the territory of Santa Cruz, but have not yet been proved to any extent. Coal has also been found in the province of Mendoza, and asphalt in the Federal Territory of Neuquen.

Exploration has begun at Salagasta, near to the town of Mendoza, and the reserve is estimated to be five million tons. The coal is bituminous in character. The Salagasta bed is believed to have a thickness of from 11 feet to 16 feet.

†Very little coal is mined in Argentina, the country being dependent for its supplies upon Great Britain and the United States.

‡According to the United States Geological Survey estimate, Argentina produced 4,707 tons of coal in 1918.

*Analyses of Coals.*

No.	Province.	Proximate Analysis.				Calorific Value.
		Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	
1	Mendoza— Salagasta seam	Per cent.	Per cent.	Per cent.	Per cent.	Cals. 5,416
2		4·60	48·23	33·02	14·15	7,221
3	San Julian     "	7·37	48·60	26·80	17·21	
4	Curileufu ...	...	65·20	34·44	0·35	
5	Tilhue     ...	8·94	51·65	35·56	3·83	
6	Las Higueras ...	11·64	50·28	33·72	4·34	
7	San Rafael     ...	1·83	51·82	44·68	1·65	
8	Tierra del Fuego ...	11·17	40·91	47·22	0·68	
9	Neuquen Territory				1·8 to 2·0	5,078

*References.*

- 1-2. Coal Resources of the World, 1913, Vol. II., p. 579.
- 3-8. E. Hermillo—Anales del Ministerio de Agricultura (Buenos Ayres) Vol. I., pp. 71-172; Journ. Iron and Steel Inst., 1905, 2, p. 589.
6. W. Bodenbender—Boletin de la Academia Nacional de ciencias de Cordoba, Vol. XVII., pp. 139-162.
9. G. L. Federicos—Oesterreichische Zeitschrift für Berg- und Hüttenwesen, Vol. LIII., pp. 681-682; Journ. Iron and Steel Inst., 1906, 1, p. 335.

*Imports of Coal and Coke into Argentina.*

Year.	Coal		Coke (long tons).
	Quantity (long tons).	Quantity (long tons).	
1913	...	...	3,981,249      20,974
1914	...	...	3,866,537      14,421
1915	...	...	2,503,003      10,963
1916	...	...	1,854,490      10,327
1917	...	...	696,338      3,840
1918	...	...	808,764      6,665
1919	...	...	1,238,515

\* Anales del Ministerio de Agricultura, Seccion de Geologia, Mineralogia y Mineria, Tomo VI, Num. 1, 1911.

† Supplement to United States Commerce Reports, May 26, 1920, p. 15.

‡ Colliery Guardian, May 13 1921, p. 1388.

**Bolivia.\***

Coalfields exist in the department of Tarija, near the border of Argentina, and also in the Beni district, but no output is reported.

At Copacabana, on Lake Titicaca, there is coal which is reported as being of fair calorific value, but associated with many impurities.

**Brazil.†**

In the southern portion of Brazil, deposits of coal are found in the States of Minas Geraes, São Paulo, Paraná, Santa Catharina, Rio Grande do Sul, and in the northern portion of the State of Pernambuco. Coal mining is carried on at Arroyo dos Patos in the district of São Jeronymo, in Rio Grande do Sul, and the mean annual production is about 14,000 tons.

The following are analyses of coals from Brazil :—

No.	State.	Proximate Analysis.				Sul-phur.	Calorific Value.
		Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.		
	Rio Grande do Sul :—						
1	Average of analyses	8·73	35·72	25·35	30·20	3·42	4832- 6225
2	São Jeronymo (upper bed).	3·43	37·52	27·28	31·77	12·96	5650
3	São Jeronymo (lower bed).	4·87	44·20	27·89	23·04	0·60	6225
	Santa Catharina :—						
4	Average of analyses ...	2·57	44·50	24·37	28·56	5·16	4635- 6703
	Paraná :—						
5	Average of analyses ...	3·75	45·52	24·36	26·37	9·20	4481- 7454
6	Minas Geraes (Barro Blanco Bed).			23·00			6176
7	Pernambuco ...	1·90	58·73	18·81	20·52		

1-5.—Ministerio da Agricultura, Industria e Commercio, Serviço Geologico e Mineralogico do Brasil : Regiones Carboniferas dos Estados do Sul, by E. P. de Oliveira, 1918, pp. 120-122.

6.—F. Katzer, Oesterreichische Zeitschrift, Vol. LIX., pp. 201-207 ; Journ. Iron and Steel Inst. (London), 1911 (2), p. 510.

7.—Coal Resources of the World, 1913, Vol. I., p. lxxii.

In the Minas district the coal is usually crushed, washed, and briquetted for the market, but a portion of the crushed product,

\* Vice-Consul MacLean, "Trade of the Republic of Bolivia for the year 1912", Dipl. and Cons. Reports No. 5110 Ann. Ser., 1913. (Cd. 6665-68).

† Commercio Exterior do Brasil, Vol. I. Serviço Geologico e Mineralogico do Brasil.

being a nut coal of fair grade, is used direct. Washing reduces the ash and sulphur content of 38 per cent. of the treated material to 14 per cent. and 1 per cent. respectively, and of the remainder to 28 per cent. and 1 per cent. respectively.

Attempts made, more than 10 years ago, to mine coal in Brazil on a large scale, proved unprofitable, as the great facilities for water transport made it possible to buy American and English coal at a less cost. Before the war, England was the principal exporter of coal to Brazil.

Owing to the restrictions placed upon the export of coal by the British and American Governments, Brazil, in 1917, imported only one-third of the quantity imported in 1913, and paid, in the aggregate, more than in that year.

The railway companies, who are the principal consumers, had to turn from coal to other fuel (or to a mixture of coal and other fuel) for their locomotives. It was found that while coal was more efficient on a steep grade, wood served the purpose quite well on a level run.

The difficulty of obtaining foreign coal during the war led to the exploration of the country's coal resources, while numerous companies were formed for the manufacture of coal briquettes. The Government assisted these new enterprises by loans, by purchasing the stock of the new companies, by building railways in the coalfields of South Brazil, and by permitting the importation, duty free, of all machinery and materials used for the purpose. Also, the Government became the chief consumers of Brazilian coal through their control of the "Lloyd Brazileiro," the biggest steamship line in South America, with a fleet of about a million tons.

Brazilian coal requires special grates in order to burn it effectively. The Government fitted most of their steamers to burn Brazilian coal, and the success of this conversion caused other steamship companies to follow their example.

In 1916, Brazil exported 2,168 tons of coal to Argentina and Uruguay, but in 1917 the exports amounted only to 6 tons.

#### *Imports of Coal into Brazil.*

Year.				Quantity	Value
				(long tons).	(£).
1913	...	...	...	2,225,988	4,018,500
1914	...	...	...	1,515,374	2,434,600
1915	...	...	...	1,145,057	2,739,700
1916	...	...	...	1,008,021	3,885,800
1917	...	...	...	805,175	4,914,300
1918	...	...	...	627,241	4,049,100
1919	...	...	...	912,146	5,084,014

**Chile.\***

Coal, probably of Tertiary age, is found chiefly in the provinces of Concepcion and Arauco, and the reserve has been estimated as follows. † :—

Province.						Quantity (in millions of tons).
Concepcion	...	...	...	...	...	210
Arauco	...	...	...	...	...	1,872
						<hr/>
					<b>TOTAL</b>	<b>2,082</b>
						<hr/>

Anthracite is found in Chile, as, for instance, in Huimpil Quilacoya, but it is not worked to any large extent.

The four principal coalfields in Chile are :—the Penco, forming part of the Bio-Bio River district ; the Coronel and Lota, lying between the Bio-Bio and Laraquete rivers (this district is one of the most important producers) ; the Colico, between Laraquete and Pilpico rivers, and the Lebu. The two first are in the province of Concepcion, and the others are in the province of Arauco.

The most important coalfields lie to the south of Concepcion. The coals vary considerably in quality, those from the lower measures as a rule being the best. Chilean coal is considered suitable for steam-raising. Tests made by the Chilean State Railways gave the heating value of the coals from the mines of Lota, Arauco, Schwager and Curanilahue as being from 7,000 to 7,600 B. Th. U. ‡

§ Recent discoveries of coal have been made in the south of Chile, near La Union. The quality is said to be good, and the area is estimated to contain 40 million tons. Another field has been discovered in the district of Castro, on the northern shore of the bay, opposite the town. A third field has been located at Mailef, six miles from the Central Railway station at Valdivia. Exploitation has already begun, and the only difficulties are the bad state of the roads and insufficient transport facilities.

|| Chilean coal was discovered in Lota in 1825. With a town, great wharves, and a fleet of vessels of its own the Lota-y-Coronel Coal Company is one of the most important industrial enterprises in Chile. Two other large concerns, the Curanilahue and the Schwager, also testify to the lucrative nature of coalmining in the Republic.

The output could be very largely increased by the exploitation of the Centro-Arauco measures, where millions of tons lie within a few miles of the coast. The recent purchase by the Government of the Lebu-Los Sauces Railway seems to indicate that it proposes to work these deposits for the benefit of the Chilean State Railways, whose coal bill creates a large deficit year after year.

\* Statistical Abstract of the Republic of Chile.

† Coal Resources of the World, 1913, Vol. II. p. 594.

‡ "The Times" Trade Supplement, July 10, 1920.

§ *Ibid.*, Nov. 22, 1919.

|| *Ibid.*, June 5, 1920.

*Analyses of Coals from Chile.*

No.	District.	Locality.	Proximate Analysis.				Sulphur.	Calorific Value.	Coke.
			Moisture.	Fixed Carbon.	Volatile Matter.	Ash.			
1	Coal-basin of Quiriquina Concepcion	Between Concepcion and Penco	14.99	44.34	38.62	2.04	Per cent.	Cals. 6,252	Per cent.
1a	...	... Island of Quiriquina	6.74	46.20	38.96	5.99	...	5.681	
2	...	... Talcahuano Rile Colon	11.30	36.19	41.14	11.36	4.30	6,322	
3	...	... Mine Carmen—Talcahuano	8.30	50.09	34.33	7.26	2.86	5,641	
4	...	... El Rosal—Concepcion	12.27	44.62	38.37	4.72	2.20	6,351	
5	...	... Seam "Chiflón" Talcahuano	10.84	44.28	37.75	7.11	1.40	6,692	
6	...	... Carmen—188 metres	9.85	45.11	40.36	4.66	0.14	7,749	
7	...	... Submarine between Tumbes and Quiri-	3.80	56.26	37.80	2.13	0.25	4,865	
8	...	... quina, El Rosal—Concepcion	11.43	35.14	29.52	23.64	0.22		
9	Island of "Santa Maria"	West and South coasts	12.54	47.04	32.78	7.62	0.45	6,174	
10	...	... Lota Mines	3.5-5.5	50-60	2-11			5,500-	
11	...	De Arriba Seam, Grande Carlos Pit	3.66	49.49	40.64	6.20	4.83	6,346	
12	{	De Arriba Seam, Carlos Pit	4.09	55.64	37.58	2.67	0.20	7,686	
	Southern or Arauco Zone	Mine Chiflón	4.52	56.74	35.00	3.62	0.44	7,425	
13	Talcahuano :—	Chiflón Doble	2.15	43.81	43.68	10.34	3.97	7,175	
14	Talcahuano	...	...	...	...			5,468	
15	Penco	...	...	...	...			5,764	
16	Santa Ana	...	...	...	...			5,559	
17	Dichato	...	...	...	...			4,913	
18	Coronel	...	...	...	...			5,630	
19	Lota	...	...	...	...			6,472	

### *References.*

- 1-13. Cool Resources of the World, 1913, Vol. II, 581-594.  
 1a. Revista Minera, Vol. LVII, 562. Journ. Iron and Steel Inst. (London), 1906, 4, p. 767.  
 14-29. Revista Comercial e Industrial de Minas, Vol. 1, No. 1.  
 30. J. Schneider, Boletin de la Sociedad Nacional, Vol. XXII, 165-175.  
 31. Ferdinand Gautier, Chili et Bolivie ; Paris, 1906, p. 80. Journ. Iron and Steel Inst. (London), 1907, 1.

*Chilean Production, Imports and Exports of Coal.*

Year.	Quantity (long tons).		
	Production.	Imports.*	Exports.
1913 ... ... ...	1,262,823	1,561,577	281,931
1914 ... ... ...	1,069,477	1,283,505	262,681
1915 ... ... ...	1,152,735	454,052	181,989
1916 ... ... ...	1,395,328	511,529	170,903
1917 ... ... ...	1,514,575	496,750	222,809
1918 ... ... ...	1,492,151	315,073†	
1919 ... ... ...	1,492,151	102,943†	

\* Including Coke.

† Provisional figures exclusive of Coke.

**Colombia.**

Although extensive beds of bituminous coal, some of them lying in close proximity to iron-ore deposits, occur in various parts of Colombia, coal mining is not highly developed, and there are no deep workings. Coal abounds in the Titiribé and Amagá districts and near Bogotá, at Teguendama, at Zipacon and elsewhere. It also occurs near the railway under construction between the port of Buenaventura and Cali, the principal town of the Cauca Valley, as well as in the peninsula of Goajira.

Important coal deposits have also been found on the flanks of the Motilones Mountains, some 270 miles from the mouth of the Magdalena River.

This coalfield appears to be of large area and to contain several thick seams of good quality, three of them approximating 34 ft. in thickness and being of a quality similar to the Barnsley bed in the South Yorkshire coalfield.

In view of the comparative proximity to the Panama Canal, this coalfield may in future be one of importance.

**Ecuador.**

\* There are no coal mines actually in operation in Ecuador, but considerable deposits have been found in several places, especially in the province of Cañar, at Cojitambo, Mangan and Biblian, a region lying between Cañar and Cuenca, and not more than 50 miles to the south of the Guayaquil to Quito railway.

The coal is said to be of excellent quality, but the absence of railway communication has prevented it being mined profitably.

To the north of Quito, at San Antonio de Pomasqui, there are seams of anthracite.

\*Several deposits of lignite have been discovered in the mountainous districts.

*Imports of Coal into Ecuador.*

Year.						Quantity (long tons).
1913	...	...	...	...	...	17,159**
1914	...	...	...	...	...	30,255
1915	...	...	...	...	...	30,511
1916	...	...	...	...	...	24,393
1917	...	...	...	...	...	35,147
1918	...	...	...	...	...	4,558
1919	...	...	...	...	...	2,901

\*\* Average imports during 1911-13.

**Peru.†**

Peat, lignite, and coal (both bituminous and anthracitic) are found in Peru. The most important peat area is in the Salinas pampas, between Moquegua and Arequipa.‡ Lignite of Tertiary age is found on the coast and on the crest of the Andes at Cajamarca. Coal and anthracite of Cretaceous age are found in various places, and a solid hydrocarbon, which is neither coal nor anthracite, occurs in veins, and is worked and sold as mineral fuel. There are very large areas of coal in the Santa Valley department of Ancachs; in the department of Lima, near Jauja; in the department of Junin, in the neighbourhood of Cerro de Pasco; and in the department of Puno. The bulk of the output is obtained from the province of Cerro de Pasco. Coal is found, however, in nearly every department of Peru, and there are fifteen principal coal belts in the country, which probably contain a reserve of 1,000 million tons of commercial coal.

\* Trade and Commerce of Ecuador for the year 1910, by Consul Cartwright; Dipl. and Cons. Rpts., No. 4,831, Ann. Ser., 1912 (Cd. 6005-4). Boletin de Estadistica Fiscal y Commercial Republica del Ecuador, 1909, Quito.

† Statistical Abstract of Peru, 1919.

‡ Mines and Mining (Official Publication), 1903. Coal Resources of the World, 1913, Vol. I, p. lxxi.

*Analyses of Peruvian Coals and Lignites.*

No.	Region.	Locality.	Proximate Analysis.				
			Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Sul-phur.
1	Carumas (bituminous coal).	—	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
	Carumas (anthracite).	—		54·8	43·0	2·2	
	Carumas (lignite).	—		84·0	12·6	3·4	
2	Chaclaya	...		47·3	50·6	2·1	
3	Pubaya	...		69·4	14·9	15·7	
4	Huamachuco	...	Callacuyan	1·27	92·39	4·40	1·94
	do.	...	Yanayacu	3·10	57·34	19·56	20·00
	do.	...	Olivo	4·30	83·74	6·80	5·16
5	Cerro de Pasco	...	Oyon (bit.)	60·67	20·28	4·10	
	do.	...	" (anth.)	79·83	6·9	8·15	
6	Queroctillo (N. Peru).	Jaguay Negro	0·26	66·96	28·07	2·15	2·54
7	Santa Valley— Anthracite ... Bituminous coal.	—	4·96	86·58	3·77	3·83	0·86
		—	8·30	64·80	21·00	5·20	0·70
8	Checas	...	Chancay Prov.	3·6	86·9	6·3	3·2

*References.*

1-3. F. Alayza y Paz-Soldan : Boletin del Cuerpo de Ingenieros de Minas del Peru No. 3, Lima, 1903. Journ. Iron and Steel Inst. (London), 1904, 1, p. 513.

4. H. Herraro : Boletin del Cuerpo de Ingenieros de Minas del Peru No. 72, pp. 33-40. F. M. Santolalla, Boletin del Cuerpo de Ingenieros de Minas del Peru, No. 51, p. 45-58.

7. F. J. Schafer, Page's Magazine (London), Vol. IV., p. 491. Journ. Iron and Steel Inst. (London), 1904, 2, p. 491.

8. E. A. V. de Habich, Yacimientos carboníferos del distrito de Checas Limas; Ministerio de Fomento, 1904. Journ. Iron and Steel Inst. (London), 1905, 2, p. 589.

*Production of Coal in Peru.*

Year.						Quantity (long tons).
1913	...	...	...	...	...	269,542
1914	...	...	...	...	...	279,298
1915	...	...	...	...	...	286,070
1916	...	...	...	...	...	313,935
1917	...	...	...	...	...	347,912
1918	...	...	...	...	...	340,662
1919	...	...	...	...	...	338,727

## Uruguay.

Some coal has been discovered in boreholes made close to the Brazilian frontier. So far as is known, the coal seams do not outcrop anywhere in Uruguay, owing to the undisturbed stratification; the continuation of the Brazilian deposits into Uruguay can only be proved by boring.\*

## Venezuela.

There are coal deposits in the State of Falcon at El Isiro, near Coro, and also at Naricual, near Barcelona, in the State of Bermudez. The coal mines, which are worked on a very small scale, belong to the Government, and all the coal mined is consumed locally.

†According to an estimate made by A. L. Pearse and J. Roberts, the Naricual seam underlies an area of 40 square miles, giving for that area a reserve of  $5\frac{1}{2}$  million tons of coal.

†The Capiricual and Tocoropo valleys also contain a large quantity of coal. The principal exploration has been on the left side of the Aragüita (a tributary of the River Naricual) where the seams outcrop.

### *Analyses of Venezuelan Coals and Lignites.*

No.	Locality.	Proximate Analysis.					Calorific Value.	Coke.
		Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Sul-phur.		
1	Aragüita ...	10·20	48·00	39·80	2·00			
2	" ...	5·50	47·60	43·90	3·00			
3	" ...	6·00	45·00	43·00	6·00			
4	" ...	5·30	51·40	39·90	3·40			
5	" ...	1·72	65·10	31·12	1·63	0·43		
6	Simplicio ...	3·80	66·25	25·70	4·25			
7	Orilla derecha	3·80	58·70	33·25	4·25			
8	Aragüita ...	0·95	62·02	35·26	1·77	0·98		
9	" (panela).	2·70	59·50	32·85	4·95	0·83		
10	Naricual ...	1·25		38·43	2·83		9,053	58·49

### *References.*

- 1-9. Coal Resources of the World, 1913, Vol. I, p. lxx.  
 10. Rassegna Mineraria, Vol. VII, pp. 213-215.

\* Zeits. f. prakt. Geol., Dr. G. Guillemen, Berlin, Sept., 1910.

† Coal Resources of the World, 1913, Vol. I, p. lxx.

*Venezuelan Production, Imports and Exports of Coal.*

Year.	Quantity (long tons).		
	Production.	Imports.	Exports.
1913 ... ... ...	6,000	19,360*	
1914 ... ... ...	8,614	22,906	
1915 ... ... ...	13,333	18,995	
1916 ... ... ...	17,995	19,918	492
1917 ... ... ...	19,527	14,687	1,968
1918 ... ... ...	24,381	8,605	335
1919 ... ... ...			

\* Average imports during 1911-13.

## FOREIGN ASIA.

**Afghanistan.**

\*Coal occurs in considerable quantity in the neighbourhood of Chahil and Shisha-Alang in Afghan Turkistan. Numerous seams outcrop over a wide area, but no exploratory work whatever has been done, although, so far as is known, the quality of the coal is good and there are said to be some seams over ten feet in thickness.

**China.†**

Coal is widely distributed throughout China, especially in the provinces of Chihli, Shansi, Shantung, Honan, Hunan, Kwangsi, and Szechuan.

The coalfields which at present are considered to be the most important are those in the provinces of Chihli and Shantung, which, after the fall of Tsingtau in the autumn of 1914, came under the rule of Japan.

A treaty made between England and China in 1902, by which the Chinese agreed that their minerals should be worked by both foreign and Chinese capital, is still unrecognized, a plan drawn up in 1904 being repudiated by the diplomatic corps in Peking, principally because the Chinese capitalists objected to being brought into competition with foreigners.

\* Coal Resources of the World, 1913, Vol. I, p. 364.

† Chinese Maritime Customs, Returns of Trade and Trade Reports (Annual).

\*The Kaiping Collieries near Fangshan in the province of Chihli (North China) are operated by the Chinese Engineering and Mining Co., Ltd. (British). This company, in 1912, amalgamated with the Lanchow Mining Company, the business being worked under the title of the Kailan Mining Administration, which now controls the mining rights of the Kaiping basin, which has an estimated area of 100 square miles, being 20 miles in length and, on an average, 5 miles in width. The annual output is over three million tons, of which 1,282,735 tons were exported in 1918. In that year 33,244 tons of coke were produced, of which 16,991 tons were exported. In 1919 the production was about 4 million tons. The Kailan Mining Administration has lately entered into an agreement with the Shansi Provincial Government for the exploitation of the coalfields of Northern Shansi.

†In this province, at present, coal is produced chiefly in the Kao Chun Valley, where it is worked over a distance of 70 miles, and a branch line between the mines and Tatung Fu provides railway communication with Peking.

‡It is the intention of the Kailan Company to establish an iron and steel industry in Northern China, and in order to deal with the developments expected, arrangements have been made for the enlargements of the port of Chinwangtao with a view of making it the leading port in North China.

§ The total coal reserves of China are estimated to be as follows :—

	Tons.
Anthracite coals ...	387,464,700,000
Bituminous coals ...	607,523,000,000
Brown coals and lignites	600,000,000
TOTAL ... ...	<u>995,587,700,000</u>

The coal production of China has increased very considerably during recent years, owing to the ever-growing demand, especially in the coastal districts, and to the stimulus of foreign competition.

No reliable figures are available as to the actual production of coal in China. It is estimated that in 1900 it amounted to about 5 million tons.|| In 1910, according to the Japanese geolo-

\* Commerce Reports, No. 18, 1920, p. 423.

† Min. Journ. (London), 1920, Vol. cxxviii, p. 171.

‡ Times Trade Supplement (London), Feb. 14th, 1920.

§ Coal Resources of the World, 1913, Vol. I, p. lii.

|| Zeitschrift für praktische Geologie, 1920, Vol. 28, p. 108.

gist, Kato, it amounted to nearly 10 million tons. According to T. T. Read, formerly professor of metallurgy, Peiyang University, it was 13 million tons prior to 1913. The Chinese Official Estimate for 1914 was as follows\* :—

Province.			Quantity. (tons).
Manchuria	...	...	840,000
Chihli	...	...	2,160,000
Shansi	...	...	2,500,000
Shensi	...	...	50,000
Kansu	...	...	—
Shantung	...	...	932,000
Honan	...	...	500,000
Szechuan	...	...	800,000
Kweichow	...	...	—
Yunnan	...	...	30,000
Kiangsi	...	...	800,000
Hunan	...	...	300,000
Hupeh	...	...	100,000
Anhui	...	...	30,000
Kwangtung	...	...	50,000
Kwangsi	...	...	50,000
Kiangsu	...	...	—
Total output in other provinces			130,000
<hr/>			
TOTAL	...		9,272,000
<hr/>			

The following figures,† prepared by F. C. Tryon, of the U.S. Geol. Survey, give the total coal production of China as follows :—

		(long tons.)
1913	...	13,558,000
1914	...	9,123,000
1915	...	17,710,000
1916	...	21,351,000

‡It is estimated that the total output of coal in 1919 was 23 million tons, of which 13 million tons were produced by modern methods, and the remainder by native methods.

Although Chinese coal is preferable to Japanese coal owing to its freedom from sulphur, over one million tons of the latter is imported annually, chiefly into Hong Kong, and disposed of to the steamers, oil-refineries and spinning mills.

\* Report of Ministry of Agriculture and Commerce for 1914.

† Coal Age (New York), Vol. 18, No. 12, 1920, p. 600.

‡ Report for 1919 on the Conditions and Prospects of British Trade with China, by H. H. Fou, Department of Overseas Trade, 1920, p. 17.

### Manchuria.

\*In Manchuria, the coal is chiefly the production of the Fushun collieries, which are situate about 20 miles east of Mukden, and connected by means of a branch line with the South Manchurian Railway. After the Russo-Japanese war, the Fushun mines passed into the hands of the Japanese, and, in 1907, the South Manchurian Railway Company was entrusted with their development. The output from these collieries increased from 233,325 tons in 1907 to 2,169,245 tons in 1915. The production in 1919 was 2,928,186 tons. Over 20 per cent. of the output of the Fushun mines is exported to Japanese, Chinese and other Asiatic ports, and to the Philippine Islands. The Yentai coal-field, which lies about 40 miles south of Mukden, close to the railway, is also principally controlled by the Japanese.

Other coalfields are at Fen-hsi-hu, about 40 miles south-east of Mukden; Niu-hsin-tai, about 12 miles east of Pen-hsi-hu; Wu-hu-tsui, about 40 miles north-east of Dairen; Liangsi; Naitzeshan; and in the Hunchun district, on the north-west border of Korea. In all, about 30 mines are working.

The Fushun coal is bituminous and has a calorific value of 7,000 calories. It is very suitable for steam-raising and gas-making, and, as it runs high in nitrogen, the South Manchurian Railway Company has erected a Mond gas plant, with an ammonia by-product plant. The Pen-hsi-hu and Yen-tai coals are more difficult to ignite. They coke well, and are suitable for briquette-making. The Fushun coal is largely used by steamers calling at Manchurian ports; it is sent as far south as Hong Kong, as well as north to Harbin. The other coals are mainly consumed locally.

The following are the amounts of coal exported in recent years :—

—	1913.	1914.	1916.
From Manchuria into the leased Territory	Tons. 1,195,204	Tons. 1,218,584	Tons. 837,385
From Dairen (including junk traffic)	1,011,152	990,823	833,581
From Newchwang (through Maritime and Native Customs).	307,583	338,019	83,458
From Antung ...    ...    ...    ...	140,549	145,750	207,661

The price per ton of the coal exported from Dairen, in 1916, was 13s. 3½d.

\*The reserve of coal for the whole of Manchuria is estimated at 1,209,000,000 tons, distributed in the following grades:—

		Tons.
Anthracitic and non-coking	...	68,500,000
Bituminous	...	254,000,000
Bituminous, with high volatile content		886,500,000
		<hr/>
TOTAL	...	1,209,000,000
		<hr/>

### Production of Coal in Kwantung.

(Fiscal years ending March.)

Year.		Quantity (long tons).
1913	...	1,488,934
1914	...	2,244,098
1915	...	2,131,529
1916	...	2,204,267
1917	...	2,096,971
1918	...	2,351,180
1919	...	...

This table shows only the production of the collieries administered by the South Manchurian Railway Company. The coal-mining concessions in this Province were ceded to Japan in 1915.

### Analyses of Chinese and Manchurian Coals.

Province.	No.	Coalfield.	Proximate Analysis.					Sulphur.	Calorific Value.
			Mois-ture.	Fixed Car-bon.	Vola-tile Mat-ter.	Ash.			
<i>China.</i>									
Chihli (Carboniferous).	1	Kaiping, 1st class	0·64	71·55	22·27	5·54	0·98	—	
	2	" 2nd "	0·68	67·78	21·03	10·52	0·16	—	
	3	" 3rd "	0·61	64·62	19·82	15·23	0·95	—	
	4	Linhsien	1·23	62·11	26·14	10·52	0·79	7,040	
	5	Shih-men-chai	3·45	85·42	8·85	2·28	1·17	5,610	
	6	Hsi-shan	2·48	75·09	4·01	18·24	0·28	—	
	7	Ching-hsing	0·65	63·81	28·20	7·34	0·72	7,590	
	8	Lin-ch'eng	1·71	54·80	33·49	10·00	1·27	6,908	
	9	Chi-ming-pao	2·68	56·06	26·30	14·96	0·37	5,780	
(Mesozoic)	...	Hsin-ch'iu	+ { 4·00	41·04	37·70	7·26	0·26	6,710	
	10		+ { 8·33	48·63	35·52	7·52	1·44	5,830	
			+ { 11·40	57·80	25·60	5·20	trace		
	11	Wu-chia	17·94	43·59	34·30	4·17	0·48	5,000	
	12	Shih-ta-fen	15·73	40·19	37·89	7·05	1·55	5,335	
	13	Ch'i-chia-tzu	3·12	46·90	27·30	23·68	0·12	5,632	

\* Coal Resources of the World, 1913, Vol. I, p. liii.

† In these cases, the analyses given are those showing the highest and lowest percentage of fixed carbon.

Province.	No.	Coalfield.	Proximate Analysis.				Sulphur.	Calorific Value.		
			Mois-ture.	Fixed Car-bon.	Vola-tile Mat-ter.	Ash.				
Shantung (Carboniferous)	14	Wei-hsien ...	2·01	51·23	30·60	16·60	1·22	6,550		
	15	Po-shan ...	0·95	77·72	16·25	5·08	0·96	7,370		
	16	Tzu-ch'uan ...	0·48	73·01	17·88	8·63	1·16	7,270		
	17	" ...	1·03	61·64	13·71	23·62	0·41	5,610		
	18	I-chou (Fen-huang-tan)	0·68	76·68	20·62	2·02	1·68	7,425		
	19	"	0·67	51·58	16·81	30·96	8·36	4,950		
	20	Chang-ch'iu "	0·43	66·86	18·18	14·58	0·50	6,820		
	21	Hsin-tai ...	1·74	58·89	37·38	1·98	2·28	7,590		
Shansi (Mesozoic)	22	Lin-shan ...	0·72	75·99	15·47	7·82	0·69	7,205		
	23	Ssu-chuan-sheng ...	0·41	70·13	18·65	10·82	2·06	6,820		
	24	Kwei-chow-sheng ...	1·60	76·45	10·15	11·80	1·64			
	"	"	0·35	72·33	18·88	5·84	2·60			
Honan (Carboniferous)	25	Chang Ho "	1·94	79·00	9·96	8·80	0·29			
	26	Jai-meい-sen ...	1·79	75·09	14·16	9·95	0·58			
Anhui	27	Chi Chow ...	13·00	73·00			14·00			
Chekiang	28	Tung Lu ...	2·10	70·74	4·41	22·74				
Kwantung	29	Lien Chow ...	1·00	66·46	15·00	17·44	3·07			
	30	Tung Shui ...	0·80	67·62	10·47	21·11	4·37			
	31	Che Ku Sheek ...	1·07	85·25	7·63	6·04	0·89			
Hunan	32	Mei Shan ...	0·79	83·45	9·34	6·41	1·06			
	33	Mei Tien, S. Hunan ...	1·84	82·58	6·32	9·26	0·73			
	34	S.W. Kweichow ...	0·80	80·00	9·50	35·00				
Kweichow	35	Near Kwei Yang ...	0·60	12·80	8·80					
	36	Pin-ting ...	3·44	84·49	7·77	4·30	1·15	5,830		
	37	Shih-pa-tsui ...	2·32	81·71	5·36	10·62	0·71	5,720		
Shansi (Carboniferous)	38	" Yang-ch-nan ...	2·88	87·18	5·16	4·80	0·74	5,225		
	39	Tai-yuan (Western Mt.)	1·31	81·41	6·85	10·44	0·39	5,445		
	40	" (Eastern Mt.)	2·59	81·60	6·85	8·96	0·88	5,170		
Fukien (Carboniferous)	41	"	2·21	87·80	9·28	0·72	1·20	6,600		
	42	"	1·26	77·03	11·90	9·82	1·33	6,160		
	43	Hsuan-oh-eng ...	3·48	81·24	12·10	3·18	1·70	6,050		
44	"	"	2·30	69·41	16·71	11·58	1·30	5,665		
	"	"	1·65	55·20	19·39	23·77	2·21			
	"	"	0·87	61·72	17·28	20·13	2·38			
45	Shao-wu ...	4·50	84·07	4·75	4·30					
	46	" Lung-yen ...	4·50	86·90	4·75	3·85	2·02	5,885		
	47	" Ping-hsiang ...	5·03	85·98	3·40	5·18				
48	"	"	4·83	64·28	4·97	25·72				
	49	Ssu-chuan-sheng ...	1·35	55·02	23·73	19·50	0·45			
	"	Kwei-chow-sheng ...	0·94	69·96	22·39	6·71	0·52			
	"	"	3·74	53·38	3·55	39·33	0·40			
	"	"	0·72	72·60	22·84	3·80	1·88			
	"	"	1·56	64·45	7·12	26·87	1·14			
<i>Manchuria.</i>										
S. part. of Province (Carboniferous)	50	Wu-hu-tsui ...	3·49	77·76	7·33	11·42	1·23			
	51	Wa-fang-tien ...	15·99	49·23	22·96	11·82	0·90			
	52	Mei-yao ...	1·27	79·29	12·44	7·00	0·66	6,710		
East of Liao-Yang-Chow and Feng-Tien (Carboniferous)	53	Mukden ...	3·43	34·68	23·61	38·28	0·54	4,400		
	54	Vladivostok ...	4·48	80·97	9·90	4·70	0·76	7,653		
	55	Yen-tai ...	5·78	74·57	13·33	6·32	0·62	7,613		
56	56	"	0·82	74·56	9·94	14·68	0·21			
	57	Pen-hsi-hu ...	14·10	43·18	36·04	6·68	0·07			
	58	Niu-hsin-tai ...	1·41	25·57	10·84	62·18	0·47	6,600		
59	"	"	0·90	84·48	10·50	4·12				
	"	Ch'ien-eh-ang-tzu ...	1·21	47·48	24·31	27·00	0·95	3,850		
	"	"	1·76	53·74	23·92	20·58	9·63	6,050		
	"	"	0·73	60·20	28·57	10·50	6·80	6,930		

\* In these cases, the analyses given are those showing the highest and lowest percentage of fixed carbon.

Province.	No.	Coalfield.	Proximate Analysis.				Sulphur.	Calorific Value.
			Mois-ture.	Fixed Car-bon.	Vola-tile Mat-ter.	Ash.		
East of the Great Wall (Carboniferous)	60	K'an-ch'ang ...	1·30	70·31	11·17	17·22	0·38	6,050
	61	Hou-huang-ti ...	1·95	77·12	14·85	6·58	0·95	6,325
	62	Hsiao-shieh .. *	0·70	72·52	24·03	2·75	1·89	8,475
	63	Hsiao-shieh .. *	1·01	71·62	23·26	4·11	1·87	9,082
	64	Ssu-p'ing-chieh Ch'ang *	1·74	85·44	8·51	4·80	0·50	
	65	Shan-sung-Kang *	0·45	57·15	24·60	17·80	0·40	6,050
	66	Pan-chieh-ho ...	4·11	69·65	8·30	17·94	0·42	5,170
	67	San-tao-yang-ch'a ...	1·24	67·64	20·50	10·62	0·95	6,710
	68	Kang-yao-kou ...	2·05	55·86	30·31	11·78	1·02	6,490
	69	Erh-fo-miao ...	1·45	84·61	9·82	4·12	0·84	6,050
West of Chin-Chou (Carboniferous)	70	Hsi-kou-tzu ...	3·89	71·78	6·31	18·52	0·72	4,180
	71	Sha-kuo-t'un ...	1·5	76·4	5·00	16·1	1·0	7,168
	72	Pai-tsao-shu-kou ...	3·20	63·50	12·50	20·80	9·85	6,198
	73	Nuan-ti-t'sng ...	1·28	47·02	29·00	22·70	0·15	6,025
	74	Hung-lo-hsien ...	2·00	59·70	20·00	18·30	5·38	6,869
	75	Sai-ma-chi ...	5·30	56·40	24·90	13·40	2·42	5,670
	76	Ta-t'ai-shan (northern section)	8·12	47·78	15·2	28·90	11·68	7,279
	77	Ta-t'ai-shan (southern section)	3·00	46·60	25·3	25·10	5·32	6,690
	78	Fang-niu-kou ...	5·32	52·88	12·1	30·2	2·18	5,957
	79	Sha-ho-tzu ... *	5·82	45·51	27·3	21·3	1·13	7,848
(Mesozoic) ...	80	Pai-tsao-shu-kou ...	7·3	50·40	20·1	22·2	0·51	6,804
	81	Nuan-ti-t'sng ...	5·20	55·80	18·90	20·10	7·69	6,367
	82	Hung-lo-hsien ...	17·60	45·80	25·30	11·30	4·37	8,463
	83	Sai-ma-chi ...	7·6	41·9	15·6	34·9	14·16	
	84	Ta-t'ai-shan (northern section)	1·41	54·86	27·04	16·69	0·95	
(Tertiary) ...	85	Ta-t'ai-shan (southern section)	1·49	70·42	22·11	5·98	0·40	
	86	Fu-shun (main coal seam).	10·56	46·54	29·68	13·20	1·52	6,787
	87	" "	17·90	62·80	22·30	7·00	3·55	7,207
(Jurassic) ...	88	Shih-men-chai ...	6·18	53·18	38·37	2·32	0·34	6,930
	89	" (lower coal seam).	7·18	54·37	35·57	2·98	0·39	7,150
	90	C'hang-ch'un ...	10·24	45·02	35·54	9·20	1·05	6,050
Chilin (Jurassic) ...	91	Huo-shih-ling ...	8·14	48·77	37·91	10·18	0·52	6,930
	92	Wu-lung-t'un ...	5·66	36·98	32·40	25·01	0·87	5,170
	93	Chu-tzu-chieh (lao-t'ou-erh-kou).	4·14	39·62	36·01	20·23	0·30	5,720
Hei-lung, Kiang-shang (Carboniferous)	94	C'hang-ch'un ...	9·22	58·90	31·88	9·34	0·87	
	95	Wu-lung-t'un ...	10·61	35·84	38·21	15·34	0·53	4,950
	96	Chu-tzu-chieh (lao-t'ou-erh-kou).	15·79	51·78	32·43	7·75	0·96	5,162
	97	Cha-lei-no-erh	10·11	45·96	25·95	17·98	0·44	5,198
	98	Cha-lei-no-erh	8·96	56·23	26·50	8·31	0·47	5,841
	99	Cha-lei-no-erh	2·63	43·60	45·97	7·80	0·26	
	100	Cha-lei-no-erh	10·46	40·71	38·13	10·70	0·20	

\* In these cases, the analyses given are those showing the highest and lowest percentage of fixed carbon.

1-4.—Yang Tsang Woo. Trans. Amer. Inst. Min. Eng., Vol. XXXVI, 661-662, Journ. Iron & Steel Inst., 1906, 1, 342-343. Coal Resources of the World, 1918, 1, 179. H. C. Hoover; Paper read before Inst. Min. and Met., June 19, 1902; Journ. Iron and Steel Inst., 1902, 2, 419.

53-54.—M. Loze, Annales des Mines de Belgique, Vol. IX, 616. Journ. Iron and Steel Inst., 1904, 2, 492.

80-81.—W. A. Moller, Bull. Amer. Inst. Min. Eng., 1910, 307-309. Journ. Iron and Steel Inst., 1911, 1, 569.

55-52, 55-79, 82-87—Coal Resources of the World, 1918, Vol. I, 129-214.

*Exports of Coal from China.*

To	Quantity (long tons).						
	1913.	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom ...	795	8,718	2,496	1,967	—	—	1,530
Hong Kong ...	197,023	280,950	250,644	219,680	236,747	169,790	161,092
Singapore ...	110,232	131,003	119,828	70,534	30,706	32,836	394
Japan ...	698,644	1,075,196	569,523	534,441	679,796	804,985	644,102
Korea ...	236,548	223,460	246,280	270,725	410,313	470,179	555,351
Philippine Islands	120,475	166,675	54,129	120,196	134,834	175,454	67,144
Other Countries ...	101,532	92,397	51,499	76,148	57,908	27,453	24,076
<b>TOTAL...</b> ...	<b>1,465,249</b>	<b>1,973,394</b>	<b>1,294,399</b>	<b>1,293,691</b>	<b>1,550,304</b>	<b>1,680,697</b>	<b>1,453,689</b>

*Imports of Coal into China.*

From	Quantity (long tons).						
	1913	1914.	1915.	1916.	1917.	1918.	1919.
United Kingdom ...	40,261	8,447	—	—	—	—	—
Hong Kong ...	247,418	255,091	254,321	203,045	221,457	168,295	218,189
French Indo-China	210,927	198,650	187,373	113,498	56,232	20,279	78,948
Japan (including Formosa)	1,247,981	1,196,836	962,689	1,084,296	1,122,854	833,300	831,107
Other Countries ...	10,065	15,640	25,004	46,273	80,085	74,544	69,044
<b>Direct Gross Import</b>	<b>1,756,652</b>	<b>1,674,664</b>	<b>1,429,387</b>	<b>1,447,112</b>	<b>1,480,628</b>	<b>1,096,418</b>	<b>1,197,288</b>
<b>Re-exported abroad</b>	<b>92,935</b>	<b>99,440</b>	<b>51,512</b>	<b>47,974</b>	<b>59,713</b>	<b>38,639</b>	<b>43,314</b>
<b>Total Net Import</b>	<b>1,663,717</b>	<b>1,575,224</b>	<b>1,377,875</b>	<b>1,399,138</b>	<b>1,420,915</b>	<b>1,057,779</b>	<b>1,153,974</b>

*Exports of Coke from China.*

Year.	Quantity (long tons).					
1913	...	...	...	...	...	4,088
1914	...	...	...	...	...	9,245
1915	...	...	...	...	...	8,409
1916	...	...	...	...	...	10,732
1917	...	...	...	...	...	66,963
1918	...	...	...	...	...	91,981
1919	...	...	...	...	...	37,891

*Imports of Coke into China.*

Year.	Direct Gross Import (long tons).	Re exported abroad (long tons).	Total net import (long tons).
1913	5,507	—	5,507
1914	5,511	—	5,511
1915	5,503	368	5,135
1916	4,877	692	4,186
1917	5,063	969	4,094
1918	4,087	—	4,087
1919	4,250	—	4,250

### Indo-China (French)\* (Tonking and Annam).

Both anthracite and bituminous coals are found in Tonking and Annam, anthracite being by far the more important.

The principal coal areas in Tonking are the basins of Hongay (the most important), Ke-bao Island, and Dong-Trieu. The superficial area of the fields is about 400 square miles, and they contain an estimated reserve of 20,000,000,000 tons of anthracite.

The largest coal-bearing area in Annam is the basin of Nong-Son. For this basin M. Edmund Fuchs ("Annales des Mines," Vol. 11, 1882, p. 247) gives an average thickness of 8 ft. 3 in. of coal, and a minimum available tonnage of 2,500,000 tons.

† In Tonking the principal coal-mining centre is at Hongay, in the Along Bay, the output from which rose from 365,178 tons in 1913 to 489,996 tons in 1914, and to 531,321 tons in 1915. Six other coal mines are being worked in Tonking, whose average output reaches 147,000 tons, all of which is used by the fleets of the extreme East. The only mine at present being worked in Annam is the Nong-Son, near Touran; its output averages about 20,000 tons per annum. Coal deposits have been found in the region of the Luang-Prabang (Tonking). Lignite is found in Tonking in the lacustrine basins of Yen-Bay, Tan-Nhuan, Laokay and Lang-Son. The Tan-Nhuan basin (the only area which is being worked) yields an average annual output of 20,000 tons. In 1917 Tonking exported some 373,000 tons out of a total production of 659,000 tons.

#### *Production and Exports of Coal in and from Indo-China.*

Year.	Production.		Exports.	
	Quantity (long tons).	Value* (£).	Quantity (long tons).	Value* (£).
1913 ... ... ...	501,444	238,065	313,652	134,179
1914 ... ... ...	610,036	294,211	319,777	148,176
1915 ... ... ...	633,552	301,663	393,768	173,129
1916 ... ... ...	674,306	334,160	357,412	168,178
1917 ... ... ...	643,401	421,223	308,639	201,311
1918 ... ... ...	626,000		248,000	
1919 ... ... ...	654,000		348,000	

\* Values converted to £ sterling at the average rate of exchange for each year.

### Japan.‡

The coal-bearing formations of the Japanese islands range from Secondary (or Mesozoic) to Tertiary. Japan does not possess any

\* Statistiques de l'Industrie Minière dans les Colonies Françaises.

† French Year Book, 1919, p. 945.

‡ Annual Statistical Reports of the Department of Agriculture and Commerce

coal of Primary (or Palæozoic) age. The coal, which occurs in 43 of the 49 prefectures of the Empire, is mainly bituminous, and most of the seams belong to the Tertiary period. The principal coalfields may be divided into five groups, as follows:—Kyushu, Hokkaido, Honshu (the main island), the Southern islands, and Karafuto (Japanese Sakhalin).

\*The Kyushu group, which consists chiefly of the coalfields of Chikuho, Miike, Karatsu, and Sasebo, supply 75 per cent. and the Hokkaido group, which consists of the coalfields of Ishikari, Kavanuma, Uryu-rumoi, Haporo, Horonobu, Soya, Uruporo, and Makuupet, supply 10 per cent. of the total coal output of Japan, which amounted to nearly 28 million tons in 1918.

†In Karafuto, or Japanese Sakhalin, lignite has been mined at Serutonai, on the west coast near the Russian border, and seams have been located in the south-western area, particularly in the Notoro peninsula. The lignite is, however, inferior to that found in Russian Sakhalin.

‡ The total reserve, contained in areas that are fairly well known, is estimated to be:—

	Tons.
Anthracite, and anthracitic coals	... 60,000,000
Bituminous coals	... 7,130,000,000
Lignite	... 779,000,000
	<hr/>
TOTAL	7,969,000,000

§ According to a report of the Mining Bureau of the Department of Agriculture and Commerce, the available resources aggregate over 800,000,000 tons, the calculation being based mainly on seams lying not more than 2,000 feet below drainage-level. Seams lying at a greater depth, but judged equally workable, are estimated to yield nearly 3,000,000,000 tons.

|| The annual exports of coal from Japan were about 3,000,000 tons prior to 1917, and about 2,000,000 tons in 1918 and also in 1919, China taking about half this amount each year. The Straits Settlements and the Philippines respectively take 400,000 tons and 350,000 tons annually from Japan. About

\* Board of Trade Journal (London), 1920, Vol. cv, No. 1240, p. 273.

† Foreign Office Historical Handbook No. 56 (Sakhalin), 1920, p. 34.

‡ Coal Resources of the World, 1913.

§ Colliery Guardian (London), Sept. 17th, 1920, p. 807.

|| Department of Overseas Trade. Report on the Commercial Industrial and Financial Situation of Japan, 1914 to 1919, by H. Horne, Commercial Secretary to H.M. Embassy, Tokyo, 1920, p. 33.

700,000 tons are imported into Japan each year, principally from China.

The insufficiency of Japan's coal supply is indicated by the great number of schemes for hydro-electric power development.

The rise in the price of Japanese coal, of good average bunker quality, supplied at Moji, is shown by the following table:—

1913—Second half	...	...	...	Normal.
1914 { First half	...	...	...	{ 9s. to 11s.
Second half	...	...	...	
1915 { First half	...	...	...	11s. , , 12s.
Second half	...	...	...	13s. , , 14s.
1916 { First half	...	...	...	16s. , , 17s.
Second half	...	...	...	17s. , , 20s.
1917 { First half	...	...	...	20s. , , 24s.
Second half	...	...	...	24s. , , 36s.
1918 { First half	...	...	...	36s. , , 37s.
Second half	...	...	...	37s. , , 48s.
1919 { First half	...	...	...	48s. , , 52s.
Second half	...	...	...	52s. , , 54s.

#### *Production of Peat in Japan.*

Year.	Quantity (long tons).	Value* (£).
1913 ... ... ... 98,030	18,824	
1914 ... ... ... 103,505	20,211	
1915 .. ... ... 98,498	20,008	
1916 ... ... ... 106,971	25,353	
1917 ... ... ... 150,439	55,168	
1918 ... ... ... 170,609	103,468	
1919 ... ... ... 187,235	149,390	

\* Values converted to £ sterling at the average rate of exchange for each year.

*Analyses of Japanese Coals.\**

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	Coalfield.	Proximate Analysis.				Sulphur.	Calorific value.
		Moisture.	Fixed Carbon.	Volatile matter.	Ash.		
Kara-futo (Sakhalin)	Nai-buchi ...	Per cent. 5·67 12·36 10·92 11·13 2·94	Per cent. 46·86 43·06 45·74 38·91 66·93	Per cent. 40·16 36·28 38·03 22·87 27·47	Per cent. 7·32 8·30 5·31 7·09 2·65	Cals. 0·40 0·45 0·43 0·53 0·89	Bituminous—generally caking. Bituminous—generally non-caking. Generally bituminous and slightly caking.
	Notoro ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Bituminous and caking.
	Porona ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Bituminous and caking.
	Noborippo ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Seratonia ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Ishikari :—	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Popet ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Otaushimai ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Kayanuma ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Uryu-rumoi ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
Hokkaido	Haporō ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Horonobu ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Soya ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Ishikari ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Obashiribetsu ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Makunipro ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Makunipro ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Johan ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Aburato ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Nobi ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
Honshu	Kumano ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Onoda ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Kado ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Akataki ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Omine ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Tsuta ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Chikuho ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Miike ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Karatsu ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Sasebo ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
Kyushu	Takashima ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Odatsu ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Amakusa ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Yaejama ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.
	Yaejama ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	... ... ... ... ...	Seams vary—caking in one district, non-caking in another.

*Japanese Production, Imports and Exports of Coal.*

Year.	Quantity (long tons).		
	Production.	Imports.	Exports.
1913 ... ... ...	20,973,384	567,502	3,808,394
1914 ... ... ...	21,935,182	942,317	3,529,161
1915 ... ... ...	20,161,431	604,798	2,877,098
1916 ... ... ...	22,533,519	547,173	2,968,460
1917 ... ... ...	25,937,754	701,620	2,768,246
1918 ... ... ...	27,578,952	755,482	2,161,727
1919 ... ... ...	30,768,522	688,402	1,968,543

*Consumption of Coal by Commercial Undertakings in Japan.*

Year.	Quantity (long tons).					
	Japanese Ships.	Foreign Ships.	Railways.	Factories.	Salt production.	Total.
1913 ...	3,109,236	1,541,350	1,757,071	7,491,527	785,396	14,684,580
1914 ...	3,879,103	1,172,702	1,884,528	8,224,686	797,847	15,958,866
1915 ...	4,502,419	796,248	1,884,978	8,002,023	812,989	15,998,657
1916 ...	4,317,802	917,888	1,961,424	10,258,517	824,902	18,280,533
1917 ...	4,407,755	809,041	2,361,302	12,029,945	766,611	20,374,654
1918 ...	4,698,823	491,886	2,892,925	14,015,003	557,108	22,655,745
1919 ...	5,084,500	665,615	3,220,587	14,581,114	850,565	24,402,381

*Formosa\* or Taiwan (Japan).*

† Coal of Tertiary age is found in the northern part of the island of Formosa. The Taiwan coalfield covers an area having a total length of about 90 miles and a breadth of  $1\frac{1}{2}$  to  $5\frac{1}{2}$  miles. The seams are numerous and are interbedded, generally, with shale, sometimes with shale and sandstone, and, rarely, with sandstone. They may be grouped into 12 series, each containing from 5 to 9 seams, of which 2 or 3 are workable. The coal, generally, is of the caking, bituminous variety, with the following average proximate analysis :—

	Per cent.
Moisture ... ... ...	3'92
Fixed carbon ... ... ...	52'05
Volatile matter ... ... ...	38'97
Ash ... ... ...	5'06
TOTAL ...	100'00
Sulphur ... ... ...	1'99
Calorific value ... ... ...	12,190 B.Th.U.
Specific gravity ... ... ...	1'278

\* Annual Reports of Department of Agriculture and Commerce, Japan.

† Coal Resources of the World, 1913, Vol. I. pp. 344-5.

\*The total reserve of Formosan coal is estimated, variously, at quantities between 691,840,000 tons and 850,000,000 tons. The following figures show the striking development of the coal industry during the last few years :—

Year.	Production.				
	Quantity (long tons).				
1913 ... ...	...	...	...	314,238	
1914 ... ...	...	...	...	337,278	
1915 ... ...	...	...	...	373,271	
1916 ... ...	...	...	...	509,263	
1917 ... ...	...	...	...	662,192	
1918 ... ...	...	...	...	757,140	
1919 ... ...	...	...	(estimate)	1,130,000	

The consumption, export, etc., of coal, in 1919, were as follows—the exports being chiefly to Hong Kong, Philippine Islands, Shanghai and Singapore :—

	Tons.		
Island consumption ...	...	...	570,000
Export ...	...	...	480,000
Ships' bunkers ...	...	...	100,000

The production could be considerably increased, and an output of as much as 5 million tons per annum would be easy of attainment, were it not for defective harbour and transport facilities. Much of the coal produced is of excellent quality, though somewhat liable to spontaneous combustion. The Formosan coal is expected to have an important influence on Far Eastern trade in the future.

#### *Analyses of Formosan Coals.†*

Coalfield or Locality.	Proximate Analysis.				
	Moisture.	Fixed Carbon.	Volatile Matter.	Sulphur.	Ash.
Kilung ... ...	Per cent. 3·86 6·43	Per cent. 55·01 51·11	Per cent. 37·37 38·83	Per cent. [1·91] [0·69]	Per cent. 4·06 3·63
Toyen ... ...	1·66	58·06	38·01	[1·15]	2·27
Shimko ... ...	5·23	51·72	40·60	[3·54]	2·44
Shinchiku ... ...	3·92	33·67	53·11	[2·51]	9·88
Daitebu ... ...	5·24	47·25	41·00	1·41	5·10
Daito ... ...	14·50	40·50	41·25	trace	3·75

\* Report on the Commercial, Industrial, and Financial Situation in Japan, Department of Overseas Trade, 1914-1919, by H. Horne, Commercial Secretary to H.M. Embassy, Tokyo, 1920, pp. 61, 62.

† Mining in Japan, Past and Present; Bureau of Mines, Japan, 1909, p. 132.

### Korea or Chosen (Japan).

\*Coal of Palæozoic, Mesozoic, and Tertiary age is found in Korea, but the Mesozoic coal is the most important and most largely mined. The coal, however, is of poor quality, the seams are thin and vary in thickness, and the work is conducted mostly in a primitive manner—by farmers when they have nothing else to do.

As the thickness of the coal seams in Korea is so irregular, in estimating the coal reserves of the various areas an average aggregate thickness of only three feet of coal has been assumed, although occurrences of 20 feet are reported.

\*It is estimated that an area of eight square miles is probably coal-bearing and that it contains the following reserves :—

	Tons.
Anthracite and anthracitic coal	40,820,000
Bituminous coal...     ...	14,130,000
Lignite     ...     ...	27,000,000
<hr/>	
TOTAL     ...	81,950,000
<hr/>	

Pyeng-yang is the chief producing coalfield. The coal raised is anthracitic and easily crumbles to powder. The mines are worked by the Government, and the coal is sent to Japan for the manufacture of briquettes. In 1912, 82,900 tons of Pyeng-yang anthracite, valued at £33,000 were sent to the naval briquette factory at Tokuyama.

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\* Coal Resources of the World, 1913, Vol. I., p. 215.

*Analyses of Korean Coal.\**

Province.	Coalfield.	Proximate Analysis.				Sulphur.	Calorific Value.
		Moisture.	Fixed Carbon.	Volatile Matter.	Ash.		
South Ham-gyong	Yong-tang-ni (Palaeozoic)	9·24	78·25	7·67	4·84	0·19	6,380
	Kai-chhyon	5·21	83·53	5·89	5·37	0·23	5,060
South Pyeng-an	An-ji-yut (Mesozoic) ...	{ 17·18	40·23	36·33	6·26		
	"	{ 18·11	39·35	32·81	9·73		
	Pyeng-yang	23·68	35·84	29·64	10·84	0·77	
	Southern Section	22·12	86·20	10·00	3·80		
	Eastern Section :—	3·35	84·92	6·79	5·64	0·42	
	Ko-pang-san†	3·45	86·20	4·26	6·09		
	Pong-whang-dong†	2·57	77·74	3·60	16·09		
	Ko-hi-ni ...	2·77	80·31	3·32	13·60	0·18	
	Nam-gang District†	14·45	53·46	24·70	7·39	0·18	
		2·18	89·97	4·61	3·23	2·03	7,150
		0·47	51·26	13·62	24·65		
		0·88	56·15	12·58	30·39		
Whang-Hai	Sam-ka-phot (Mesozoic)	14·59	38·08	38·14	9·19	1·27	5,445
	Sar-i-nuont†	18·95	36·04	36·17	7·64	1·23	5,509
		1·00	55·40	3·72	29·88		
	Tai-myong	7·13	69·09	7·82	15·96	0·32	
S. Chhyung-chhyong	Pho-non	9·78	58·02	8·29	24·91	0·38	
S. Chyol-la	Kui-hahoi	9·79	31·32	4·46	14·23	3·33	4,950
	Na-Nam† (Tertiary)	12·31	32·74	45·99	8·96	3·85	5,940
North Ham-gyong	Chyang-gi†	5·76	47·89	35·43	10·92	2·58	6,745
North Kyong-syong	O-nu-chchon	8·31	51·01	31·57	9·11	0·71	6,820
South Ham-gyong	"	13·07	40·13	43·77	3·03	6·050	
South Kyong-syong	Ul-san	7·55	35·42	46·33	10·70	9·05	5,425

\* Coal Resources of the World, 1913, Vol. I, pp. 215-237.

† In these cases the analyses denoting the highest and lowest fixed carbon content have been quoted.

*Production of Coal in Korea.*

Year.	Quantity (long tons).	Value* (£).
1913	...     ...	125,932     58,179
1914	...     ...	180,317     82,730
1915	...     ...	225,439     101,915
1916	...     ...	187,694     86,507
1917	...     ...	192,004     123,208
1918	...     ...	185,592     144,284
1919	...     ...	

\* Values converted to £ sterling at the average rate of exchange for each year.

**Persia.**

Persia apparently contains large undeveloped coal-resources, about which, however, there is little available information; coal is mined in many places, but in a primitive manner.

The Teheran-Kazvin valley has an area of about 1,000 square miles, largely covered by alluvium, and coal seams crop out over small areas in the hills to the north. \*The estimated possible reserve of this field is 1,858 million tons of coal. The field is divided into north-western and north-eastern districts, and the annual output of the north-western part is estimated at 11,000 tons, while that of the north-eastern part (where coal has, to a large extent, taken the place of wood as fuel) is placed at about 4,000 tons. In the Khorasan coalfield the seams are reported to be thin, and are not being mined. In Astrabad, Shahrud, Bastam and Semnan districts, in the north-eastern part of Persia, good bituminous coal is known to occur; the seams are not thick, 5 feet being the thickest reported. Coal of poor quality has been found at several places in the Mazanderan district, and anthracite, it is reported, occurs in Kerman and Yezd.

*Analyses of Persian Coals. †*

Coalfield.	District.	Proximate Analysis.		
		Fixed Carbon.	Volatile Matter.	Ash.
Teheran .. ...	Feshend ...	Per cent. —	Per cent. —	Per cent. 7·08
" .. ...	Abyek ...	—	—	{ 1·2 to 1·9
" .. ...	Shamsek ...	72·21	16·65	11·14

**Philippine Islands.**

‡ Coal occurs in six general geographical areas, viz., Batan, Cebu, Polillo, Mindanao, Mashbate and Mindoro.

\* Coal Resources of the World, 1913, Vol. I., p. lvi.

† Coal Resources of the World, 1913, Vol. I, pp. 365-367.

‡ Mineral Resources of the Philippine Islands for the years 1911-1918.

The estimated actual and probable reserve of coal in the most important localities of the Philippine Islands is as follows:— Bituminous, 4,959,000 tons; lignite, 62,241,000 tons.

In the year 1909 about 30,000 tons of coal were mined in the Philippine Islands, but the production fell to 28,000 tons in 1910, to 20,000 tons in 1911, and in 1912 fewer than 3,000 tons were raised. The sudden decrease of production in 1912 was due chiefly to the flooding of the mine of the East Batan Coal Company, and to the wrecking by a typhoon of the surface plant of the Camansi mine in Cebu. From 1912 to the beginning of 1917 there was no commercial production. In 1917 more than 5,000 tons of coal were produced, and in 1918 the output increased threefold.

Although the greater part of the coal reserve of the Philippines consists of lignite, there is a fair quantity of bituminous coal in the island of Polillo and in the Zamboanga district of southern Mindanao. In 1918 the Batan and Cebu lignite fields were the main producers, and it is believed that these two fields will continue to supply most of the coal produced in the islands. In 1918 there was great activity in prospecting for coal in Cebu Island, in the neighbourhood of Toledo and Naga. There was also considerable prospecting in the northern part of the island of Panay, in the neighbourhood of Capiz. The coal is intermediate between peat and lignite, and it has been employed satisfactorily in conjunction with wood by the inter-island steamers. It is believed to be suitable for use in producer-gas engines. The material has been analysed officially with the following result:—

	Per cent.
Moisture ... ... ... ...	20·58
Fixed carbon ... ... ... ...	29·26
Volatile combustible matter ... ...	40·42
Ash ... ... ... ...	9·74
<hr/>	
TOTAL ... ... ... ...	100·00
Sulphur ... ... ... ...	2·13
Calorific value ... ... ... ...	4,870 cals.

The industrial activity of the Philippines is increasing and new manufacturing centres are springing up, so that either the local production of coal or its importation must increase also. In 1918 nearly half-a-million tons of coal were imported, chiefly from Japan and China, while the local production was about 15,000 tons. According to official opinion, there appears to be no reason why any coal need be imported into the Philippines if local coal can be made available for use, and one of the means that will undoubtedly solve the problem of efficient utilization of Philippine coal of all grades, apart from its use in the producer-gas plants, will be the installation of machinery to make powdered coal for industrial use and for firing in the furnaces of locomotive, marine, and stationary boilers.

*Analysis of Coals of the Philippine Islands.*

No.	Locality.	Proximate Analysis.				Ultimate Analysis (air-dried).				Sulphur.	Ash.	Calorific Value.
		Moisture.	Fixed Carbon.	Volatile Matter.	Ash	Carbon.	Hydrogen.	Nitrogen.	Oxygen.			
1	East Batan	18.32	Per cent.	36.60	Per cent.	8.55	Per cent.	51.55	Per cent.	0.92	32.64	Per cent. 1.02
2	Liguan (Batan)	...	5.81	49.71	39.39	5.09	68.14	5.08	1.11	20.56	0.12	8.55
3	Catanaqua	13.28	39.13	39.10	8.49						1.93	5.09
4	Camujumayam (Cebu)	12.49	42.41	41.63	3.47						0.65	5.221
5	Camansi	"	7.49	43.90	44.18	4.43	66.18	5.11	1.72	20.16	2.40	5.761
6	Mt. Licos	"	8.10	48.21	40.73	2.96	66.46	5.72	2.10	22.34	0.42	6.249
7	Uling	14.90	41.91	38.62	4.56						2.96	6.424
8	Bulalacao (Mindoro)...	17.57	31.49	42.43	8.51	52.60	5.87	0.96	29.52	0.35	2.54	4.959
9	Sibuguey (Mindanao)	5.32	46.65	46.17	1.86	70.20	5.44	1.73	20.34	0.43	1.86	6.751
10	Catainggan (Mashbate)...	4.87	44.18	46.50	4.45							
11	Polillo...	3.76	48.60	43.58	4.06	70.47	5.54	1.59	18.02	0.32	4.06	6.775
12	Lantawan (Cebu)	17.20	44.60	34.69	3.51						0.60	5.363
13	Batan ...	5.75	47.64	41.04	5.57					0.72		6.416

*References.*

- 1-11. Coal Resources of the World, 1913, Vol. I, p. 122.  
 12-13. J. B. Detworth, Bull. Amer. Inst. Min. Eng. (New York), 1909, pp. 39-50. Journ. Iron and Steel Inst. (London), 1908, 3.

*Production and Imports of Coal in the Philippine Islands.*

Year.	Production.*			Imports. Quantity (long tons).
	.	Quantity (long tons).	.	
1913	...	...	...	— 552,399
1914	...	...	...	— 587,534
1915	...	...	...	— 469,957
1916	...	...	...	— 455,940
1917	...	...	...	5,656 397,022
1918	...	...	...	15,411 398,599
1919	...	...	...	32,363 394,100

\* During the years 1913-1916 there was no production of economic value. In 1913 several hundred tons were mined in the exploration of the Cebu coalfields.

**Asiatic Russia.**

\* The annual production of coal in Asiatic Russia, previous to the war, aggregated about  $2\frac{1}{2}$  million tons. Owing to the dearth of statistics, particulars relating to the period now under consideration are largely dependent upon estimates.

Coal is worked for local consumption in many places in Siberia ; and, in spite of the long distances over which it must be conveyed, coal is a little cheaper than wood, which is continually becoming more expensive. With up-to-date mining methods, the price of coal would undoubtedly be reduced, and the demand for it would increase in consequence.

† At a meeting of the Mining, Machinery and Metallurgical Congress held in Petrograd in the spring of 1913, a report was presented by Professor Loutogine, in which he estimated the coal reserves of Asiatic Russia at about 175 thousand million tons. The reserves of Siberia, alone, are placed at about 174 thousand million tons, consisting of 66 thousand million tons of bituminous coal, and 108 thousand million tons of lignite or brown coal. The coal-mining industry has developed considerably since the opening of the Trans-Siberian railway. The richest coal deposits appear to be situated in Siberia, in the square formed by the towns of Novo-Nikolaiev, Tomsk, Barnaoul, and Kuznetz. From investigation, however, it appears probable that the largest quantity of coal is contained in the Amur Province, which is situated towards the extreme east of Siberia, and north of Manchuria.

The coalfields of the Kirghiz Steppes are situated in the provinces of Akmolinsk and Semipalatinsk in western Siberia, and there are brown coal deposits, both in the eastern and western parts of the district. The coal deposits in the Akmolinsk Province can scarcely be worked to advantage until the South Siberian Railway affords communication with the existing lines at Orenburg.

\* The Times Book of Russia, 1916, p. 103.

† The Russian Year Book, 1914, pp. 188, 633.

The Ekibastus coalfield, on the Irtysh River, was opened out by the Irtysh Corporation, and the production in 1916 amounted to 140,000 tons. The field covers 25 square miles, and the coal, which is of a coking quality, will be used for smelting the lead ore of the great Ridder mine of the company, which will require 350,000 tons annually. A consumption of a million tons annually for the Government and for other purposes, so soon as that production can be arrived at, is assured.

The Karagandy coalfield is being opened out by the Spassky Copper Company, but, owing to the absence of transport facilities, the coal is used only for the Company's requirements.

\*The Kuznetz coal basin in Siberia contains large deposits, vying with those of Donetz in magnitude and variety of contents, but suffering from the absence of means of transportation. Coal from this basin could be transported by river to the Urals, as well as to the Altai region, which, with its numerous deposits of various ores—iron, copper, lead, silver, gold, zinc and others—must in the future be a large consumer of Kuznetz coal, whenever communications are established. The Sudjensk coal-bearing region is a direct continuation of the Kuznetz coal basin and is crossed by the Trans-Siberian railway between Lebediansk and Sudjensk stations. Three collieries are working in the district, viz.—Andjersk belonging to the State, which, up to January, 1913, produced a total output of 2,512,000 tons; Sudjensk, which, during the fourteen years ending January, 1911, produced 1,740,000 tons; and Lebediansk. Of the mines held by the State, in the Yeniseisk Government, thirty-two are worked by private individuals. The chief mines are situated to the south of Krasnoiarsk and Minusinsk.

Rich deposits of coal occur in the Minusinsk region, to the east of the Altai, but there is no probability of a regular output until a railway has been constructed.

†In the Altai region, coal seams—some of them with a thickness of 140 feet—crop out in an area of about 26,000 square miles, between the Salair and the Kuznetz ranges.

Some of these coals are said to be of fine coking quality, and there are abundant iron ore deposits in close proximity to the coal. There are fifty-four privately-owned collieries in the Irkutsk Government, thirty-four of which together produced more than 385,713 tons in 1911, while the State collieries produced about 16,874 tons. The principal workings are near Cherepichovo, a village in the Balagansk district. The coal-bearing districts of the province of Irkutsk are:—the Cheremkovo field, situated near the Trans-Siberian railway, 80 miles to the west of Irkutsk; the Golovino field, also situated near the Trans-Siberian railway, and supposed to extend as far east as Kutulik; the Shabarta field, containing typical brown coal, which is being worked near Touloun and Ekai; and a coal area to the east of Cheremkovo.

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\* The Times Book of Russia, 1916, pp. 104, 105.

† Russian Year Book, 1914, pp. 188–192.

The coal-bearing deposits of the Trans-Baikalian Province include the brown coal in the Malinovo area, covering at least 22 square miles; the Tolbaga-Tarbagatai area with a reserve exceeding 16 million tons of mineable coal; the Tchita area with a proved reserve of over eight million tons; the Holbon-Meersanovo area; the Lake Gucinoye field; the Duroyevo area, situated on the bank of the Argun river, with a reserve of 64 million tons; the Kara-nor area, near the Trans-Baikal railway, with a reserve of 40 million tons; and the coalfield of the Bukachacha with an estimated reserve of over three million tons, but, if the whole area proves coal-bearing, the reserve may amount to over 64 million tons.

As regards quantity, the Amur Province is probably the richest; but the coal is of poor quality and is but little worked. There is, however, a colliery situated on the Bureya, a tributary of the Amur, and near the line of the new railway, which is said to be working successfully.

\*In the Primorsk district (Maritime Province) coal-measures occur all along the Sikhota-Alin Chain, which approximately follows the coastline. Both lignite and anthracite are found in considerable quantities; the former, worked at Nikolsk-Ussurisk, on the Ussurisk railway, about 20 miles from Vladivostok, yielded 107,000 tons in 1910. The anthracite deposit which has been most worked is that of Suchan, 87 miles north-east of Vladivostok, the annual output varying from 120,000 to 200,000 tons. The coal is very friable, and is got with difficulty. This area furnishes coal to the Government departments of Vladivostok, etc. In 1911, in order to preserve the industry, a considerable area round Suchan was declared to be closed territory. The same deposit appears to exist at Mongugai, 20 miles from Vladivostok, near the Amur Gulf, but the production hitherto has been very small, not exceeding 3,000 to 5,000 tons per annum. It is stated that analyses of the coal have shown 76 per cent. of carbon, and a calorific value equal to that of Cardiff coal.

The total quantity of coal extracted from the Primorsk district is estimated at 2 to  $2\frac{1}{2}$  million tons.

The annual consumption of coal in the Primorsk district before the war amounted to about half-a-million tons, divided principally among the Marine Department, the Military Department, the Russian commercial fleets, foreign commercial fleets (except Japanese), the Ussurisk Railway, and private consumption.

Notwithstanding the large reserves of coal in Asiatic Russia, about 30,000 tons a year are imported from Japan, and the tendency of this practice is to increase.

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\* Revue Universelle des Mines (Paris), 1912, series 4, vol. xxxviii, pp. 203-212.

### Turkestan.

The coal industry of Turkestan is of very recent development. The coals mined are poor in quality, and have only come into use with the almost complete exhaustion of wood for fuel. In 1910, nineteen mines were in operation with a total output of 55,257 tons of coal.

Coking coals occur in the Karatau-Chimkend and the Narin, or Andyan, districts. In the former district there are three seams, of which the upper one, 7 feet in thickness, is mined. In the latter district, nine seams of coal are known, varying from 2 to 7 feet in thickness.

Non-coking coals are found in the Osh region, and in the districts of Marguillan (Kizil-Kiya), Isfara, Hodgent (Kokinessai) and Zeravchan.

\*In round figures, there is a reserve of 170 million tons of coal in Turkestan.

### Russian-Sakhalin.

<sup>†</sup>In Russian-Sakhalin there are considerable deposits of lignite. The quality is better than the average Japanese coal, and slightly inferior to the best, but it is not equal to the Fushun coal, in Manchuria. The Sakhalin coal industry is undeveloped, owing to the greater accessibility of the coal in north Japan, Primorsk and northern China.

Coal is worked chiefly at Due and Vladimirska. It is a lignite, has about 66 per cent. of the calorific value of Welsh coal, and produces 71 per cent. of coke. The chief obstacle to its disposal is the absence of facilities for loading it, directly, into ships, lighters having to be used for that purpose.

The production in 1913—an average year—was 36,000 tons.

### *Estimated Coal Reserve of Russia-in-Asia. Abstracted from the Coal Resources of the World.*

(In millions of tons.)

Coalfield.	Actual.	Probable.	Total.
<i>Anthracite and Bituminous Coal.</i>			
Eastern slope of Urals	0·1	41·3	41·4
Turkestan	157·0	13·0	170·0
Kirghiz Steppes	100·0	—	100·0
Kuznetsk and Sudjensk	0·6	1,225·0	1,225·6
Yeniseisk	—	—	—
Eastern Siberia	70,000·0	—	70,000·0
<i>Brown Coal, or Lignite.</i>			
Eastern slope of Urals	7·5	11·7	19·2
Yeniseisk	—	316·0	316·0
Eastern Siberia	80,140·3	64·2	80,204·5
Sakhalin (Russian)	528·6	—	528·6

\* Coal Resources of the World, 1913, Vol. III., p. 1225.

† Historical Handbook No. 56 (Sakhalin), Foreign Office, 1920, p. 33,

## Analyses of Coals of Asiatic Russia.\*

	Proximate Analysis.				Ultimate Analysis.					Calorific Value.	Remarks.
	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Mois-ture.	Carbon.	Hydro-gen.	Nitrogen and Oxygen.	Sulphur.	Ash.	
<i>Eastern Slope of Urals:</i> —											
Egorshino	...	[1.48]	82.68	7.61	8.71	2.90	3.48	0.72	8.84	Cals.	Anthracitic.
Borovsky	...	0.94	81.35	6.83	10.88	0.02	0.02	...	...	...	"
Mugoirsk	...	[1.62]	51.32	34.82	13.86	1.18	1.18	14.09	14.09	Coking.	
Kyrenskais	...	12.70	39.20	43.30	4.80	71.10	5.30	8.33	8.33	Lignite.	"
Turgay	...	12.52	45.60	36.10	5.78	71.10	5.30	8.33	8.33	"	"
"	...	12.52	53.36	44.35	2.29	71.10	5.30	8.33	8.33	4.567-	
Lepsia	...	...	9.18	37.24	50.42	3.16	3.16	0.50	0.50	5.456	
Cherniaia	...	19.36	40.00	36.57	4.07	[29.09]	58.23	26.48	26.48	4.350	Brown coal.
Bogoslovsk (lump coal)	...	...	...	...	...	[32.61]	48.52	2.80	19.32	5.386	"
,	(slack)	...	...	...	...	[33.65]	55.54	3.38	25.00	16.08	"
"	(mixed coal)	...	...	...	...	[21.36]	52.36	3.11	16.85	6.08	"
Volchanka	...	...	...	...	...	91.35	3.68	2.54	1.43	0.40	Anthracitic.
<i>Turkestan:</i> —											
Ura-Tubai	...	[1.75]	90.96	8.65	0.39	1.29	1.29	1.07	1.07	4,936	Bituminous.
Chakmak-Tash, Isfansy	...	[8.65]	74.49	24.22	[3.50]	[3.50]	[3.50]	0.98	0.98	5,293	Coking.
Narin	...	[9.74]	59.05	40.95	5.20	5.20	5.20	...	...	6,459	Non-coking.
Marguilian	...	25.80	44.50	24.50	5.90	5.90	5.90	...	...	5,610	"
Istafara (upper seam)	...	16.40	45.20	29.50	5.90	5.90	5.90	...	...	5,623	"
" (lower seam)	...	[18.80]	47.90	49.20	2.90	2.90	2.90	...	...	5,117	"
Hodgent, Suluk-Tinski	...	17.50	54.10	48.00	4.00	10.30	10.30	...	...	...	
Zeravchan, east	...	53.10	44.20†	2.70	...	...	...	...	...	...	
west	...	53.10	44.20†	2.70	...	...	...	...	...	...	

\* Coal Resources of the World, 1913, Vol. III.

† Includes moisture.

	Proximate Analysis.					Ultimate Analysis.					Calorific Value. Cals.	Remarks.
	Mois-ture.	Fixed Carbon.	Volatile Matter.	Ash.	Mois-ture.	Carbon.	Hydro-gen.	Nitrogen and Oxygen.	Sulphur.	Ash.		
<i>Kirghiz Steppes:</i> —												
Kou-ou-Tchekou	...	Per cent.	Per cent.	Per cent.	7·8	15·28	Per cent.	Per cent.	Per cent.	Per cent.	7,740	Coking.
Bea-Tubai	...				45·48	12·18					6,100	Non-coking.
Kizil-Tau	...				21·16	4·80						
Kuznetz, Kemerovski	...				23·00	2·60						
Sudjensk	...				71·40	71·30						
" Volkovski	...				83·87	3·7						
<i>Yeniseisk:</i> —												
Isykh	...	...	...	...	[5·40]	57·20	42·80	5·60	76·90	5·60	7,223	
"	...	...	...	...	[4·26]	50·87	39·77	5·10		0·39	7,000	
Chernogorski	...	...	...	...	[1·2]	60·66	34·40	[3·4]		0·0·5		
Kalaginski	...	...	...	...	[1·40]	52·68	47·32			0·62	7,436	
Angara, Verchchala	...				56·28					0·37	6,462	
Tchelimo-Urupski	...				22·95					0·25	5,311	
Kuzkun	...									0·34		
<i>Eastern Siberia:</i> —												
Irkutsk District :—												
Cheremkovo	...	...	...	...	44·41	44·51	11·08			0·25		
Shabaria	...	...	...	...						0·54		
Cheremkovo-Angara	...											
Transbaikal District :—												
Malinovo, No. 1 seam		13·08									5,000-	
Duryevo, No. 3 seam		[11·20]									5,500	
	39·27											
					38·46	49·20	11·53			4,579		
										0·91		
										0·76		

<b>Amur District :—</b>								
Bureya ...	...	[6·31]	53·72	35·45	10·83	0·92	Coking.	
" "	...	[5·66]	51·43	9·48	39·09	0·12	Non-coking.	
Tirna ...	...	4·35	50·59	26·82	18·24	0·54		
Turuk ...	...	[2·35]	54·65	33·35	12·00	0·27	Coking.	
<b>Primorsk District :—</b>								
Suchan ...	...	0·59	86·86	6·35	6·00	0·47-		
Mongugai- <i>Star</i> seam ...	0·5-0·6	70·46- 80·34	11·49- 11·30	7·73- 7·76	0·63	0·82-		
<b>Muraviev-Amur Peninsula :—</b>								
Sviato - Makarieskoye, Lindholm.	60·00	30·00	10·00			0·67		
" Podgorodinskoye	76·00	13·50	10·50	0·55	61·35	7,427		
South Ussuri District :—		13·82				8,219		
Clarkson mine ...								
Yakutsk District :—								
Bulun ...	6·50	40·00	42·74	10·76				
<i>Sakhalin</i> (Russian) :—								
Pilevo ...	...	[1·77]	54·41	25·37	20·22	66·66	7·23	Coking.
Douai mine ...	...	[0·79]	68·83	27·80	3·37	80·40	0·22	
Alexandrovski mine ...	...	[2·34]	59·35	35·36	5·29	72·49	10·89	"
Vladimirovski mine ...	...	[3·92]	55·86	41·05	3·09	74·37	0·67	"
M Gatchinski mine ...	...	[4·50]	53·86	41·33	4·81	72·33	17·51	"
						16·88	0·36	
						16·37	1·17	
						16·64	1·02	

\* Nitrogen only.

*Production of Coal in Asiatic Russia.*

Year.						Quantity (long tons).
	...	...	...	...	...	
1913	...	...	...	...	...	2,583,000*
1914	...	...	...	...	...	2,572,000†
1915	...	...	...	...	...	2,922,000†
1916	...	...	...	...	...	3,444,000†
1917	...	...	...	...	...	4,141,000†
1918	...	...	...	...	...	1,867,000*
1919	...	...	...	...	...	1,542,000*

**Siam.‡**

The occurrence of coal at Nakon Sawan has been reported lately, but confirmation is wanting. Lignite or brown coal is found in the Siamese portion of the Malay Peninsula in various places, of which Bandon, Gherbi, Plien and Trang are those best known. There is considerable prospect of these lignite deposits being successfully exploited in the near future; but it is too early to say anything more definite.

The Gherbi coalfields are situated about 200 miles to the north of Penang, near the island of Tongkah, on the west coast of the Malay Peninsula. Satisfactory tests at the mines have been made recently. The reserve is very large, and there is deep water in the immediate vicinity.

**TURKEY-IN-ASIA.****Asia Minor.**

Coal has been found in various localities of Asia Minor, but, at present, there are only two coal areas of importance, viz., the Heraclea coalfield, and the lignite beds of the Marmora-Ægean zone.

§ The Heraclea coalfield occupies a belt about 37 miles in length along the Asiatic coast of the Black Sea, between the seaports of Heraclea (Eregli), on the west, and Zoongooldak, on the east. The town of Heraclea lies at a distance of about 140 miles from Constantinople. The coal-beds outcrop near the coast, and are not known to extend farther than 5 miles inland. The coal in this region was first mined successfully by a French company, the Société Française d'Héraclée, which in 1896 obtained a concession, to expire in 1946, for the construction and administration of a port at Zoongooldak, the working of a number of mines,

\* Russian Economist, April, 1921, p. 732.

† Stahl u. Eisen, Jan. 30, 1919, p. 135.

‡ Note on Mining in Siam, Royal Commission for the Louisiana Purchase Exposition, 1904, p. 6.

§ Coal Resources of the World, 1913, Vol. II. pp. 738-742. Foreign Office Handbook, No. 59 (Anatolia), 1920, pp. 86-88. Department of Overseas Trade: General Report of the Trade and Economic Conditions of Turkey in 1919, pp. 113-121.

and the building of a light railway. In 1912 the company sold 513,900 tons of coal, of which 217,000 tons were supplied for ships' bunkers at Zoongooldak, and 186,000 tons were shipped to Constantinople. Before the war there were several other companies working in the same area, but their total output was considerably less than that of the Société d'Héraclée. Shortly before the war several of the mines of this region were bought by a Belgian syndicate, and others by a German company under the control of the Deutsche Bank and Herr Hugo Stinnes. In 1916 this company took over the mines of the Belgian group. It has since undertaken the construction of a railway from the coalfield to Bolu. When war broke out between France and Turkey, the Turkish Government assumed control of the mines and other works of the Société d'Héraclée: and it afterwards bought up the harbour of Zoongooldak. It also endeavoured to bring all the mines of the region under a single new company, which was being formed in 1917 by a group of German financiers, headed by the Deutsche Bank.

The workings of the Société d'Héraclée are shallow, the greatest depth reached being less than 500 feet. There are two coal-washing plants, having a capacity of 100 tons each per hour, but they were badly damaged by the shell-fire from Russian ships. The coal, which is bituminous and said to be of the Newcastle type, but very dirty (30 per cent. of the material being removed by washing), appears in 7 separate layers, varying in thickness from about 4 ft. 6 in. to 15 ft., three of which are being worked. The present output, washed and unwashed, is estimated to be at the rate of 240,000 tons per annum. Export is prohibited, and all the coal is consumed in the country. None of the coal is converted into coke.

Regarding the lignite deposits of the Marmora-Ægean zone, the Panderma lignite mines, which lie between Kirmasli and Mikhalij, in the province of Brusa, formerly produced little, but during the latter part of the war sent more than 300 tons monthly to Constantinople. The lignite is of poor quality, and has to be mixed with better lignite or coal before being used. The most important lignite mines in Anatolia are those at Manjilik, in the same province, and belong to the Balia-Karaidin Company. From 1908 to 1912 the mines produced, on an average, 29,000 tons a year. In the province of Aidin several deposits are worked. Near Soma, mines were opened during the war, and according to report produce very large quantities of very bad lignite, some of which, however, mixed with German coal, is burned by the locomotives on the Soma-Panderma Railway, while some is sent to Smyrna. The workings at Sokia, which were fairly successful before the war, appear to have greatly increased their output. Here, too, the lignite is poor, but it is bought in Smyrna by the railways, the gasworks, and factories. Another deposit, near Nazli, has also been worked very vigorously since 1914, mainly by an American company. The

produce commands a market in Smyrna. In contrast with the mines just mentioned, a deposit of lignite, recently found near Angora, is said to be of good quality.

There are also coal deposits at Amasserah, Bolon, Castamoni, Viranshes, and near Lampsacus.

### **Armenia and Kurdistan.\***

Coal and lignite deposits, generally of poor quality, are found in most of the provinces of Armenia, and in Kurdistan near to the Armenian boundary. In Armenia, in the province of Van, there are seams of coal at Seivan, Shattakh and Akchi-Chai, and at Bashkala a seam of lignite from 40 to 50 ft. in thickness is exposed. In the province of Erzerum coal is found at Kara Khan, Hortuk, and, of a much better quality, at Lizghiaf. Lignite of a poor quality was worked at Khenek, Sivishli, Kukurtlu and Vartik, the total output in 1910 being 2,366 tons. At Sivishli a better bed of lignite has been discovered. Coal is found at Palu, in the province of Mamuret-ul-Aziz, but the deposit lies in a hollow and is difficult of access. There are coal deposits also at Komur Khan, near the Euphrates, and there is a coal mine at Tchimich Kezek, on the banks of the Menzur Chai, a tributary of the Euphrates. This mine, 37 miles from Keban Maden, might profitably be exploited in the future for the benefit of the silver mines, to which it would be linked by the river. In the province of Sivas coal of fair quality is found near Karahissar, Zara and Zile, and there is lignite at Amasia.

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\* Foreign Office Handbook, No. 62 (Armenia and Kurdistan), 1920, pp. 56-61.

*Analyses of Turkish Coals and Lignites.*

Locality and District.	Proximate Analysis.				Ultimate Analysis.				Calorific Value.
	Moisture.	Fixed Carbon.	Volatile Matter.	Sulphur.	Ash.	Carbon.	Hydrogen.	Oxygen.	
1 Kozlou (Eregli) ...	...	...	...	...	62·40	31·80	5·80	4·3	Cals.
2 Eregli (Black Sea) ...	...	...	...	...	40·50	52·00	7·50		
3 Eregli (Sea of Marmora) ...	...	[1·33]							
4 Heraclea (coals of middle series) ...									
5 " (coals of lower series) ...									
6 Cube (Heraclea) ...	...	...	...	...	61·1-	29·52-	3·19-		
7 Heraclea ...	...	1·50	61·86	27·47	0·47	7·15			
8 Keshan (bituminous) ...	...	...	...	...			8·70		
9 Silluria (Sea of Marmora) ...	...	...	...	43·50	49·50	[0·40]	2·00		
10 Rodosto (east of) ...	...	...	...	40·00	48·00	[0·66]	7·00		
11 " (west of) ...	...	...	...	47·00	48·00	[6·29]	12·00		
12 Soma, near Nazilli ...	...	...	16·88				5·00		
							6·00		
								5,266	

1. Eng. Min. Journ. (New York), Vol. LX, pp. 184-185. Journ. Iron and Steel Inst. (London), 1895, **2**, p. 409. J. D. Harveng, Revue Universelle des Mines (Paris), Vol. XX, pp. 34-70. Journ. Iron and Steel Inst. (London), 1893, **1**, p. 233.  
 2, 3, 8-11. H. G. Longridge, Trans. North of England Inst. Min. Eng. (London), 1859, Vol. III, p. 73.  
 4 and 5. L. Dominian, Trans. Amer. Inst. Min. Eng. (New York), 1916, vol. 56, p. 243. Journ. Iron and Steel Inst. (London), 1916, **2**, Vol. XCIV, p. 397. Min. Mag. 1919, XXXI, p. 153-156.  
 7. Echo des Mines (Paris), Vol. XXX, p. 1034-1036. Journ. Iron and Steel Inst. (London), 1903, **2**, p. 565.  
 6. Rassegna Mineraria, Vol. XXVIII, p. 72-73. Journ. Iron and Steel Inst. (London), 1908, **3**, p. 519.  
 12. Glückauf, Sept. 1919, p. 695.

*Production of Coal in Turkey-in-Asia.*

Year.	Coal.	Coal dust.	Lignite.
	Quantity (long tons).	Quantity (long tons).	Quantity (long tons).
1913 ... ... ...	787,421	26,110	15,399
1914 ... ... ...	626,272	14,499	9,676
1915 ... ... ...	409,171	4,397	75,027
1916 ... ... ...	204,857	*	
1917 ... ... ...	169,426	*	192,425
1918 ... ... ...	197,087	*	152,284
1919 ... ... ...	473,595	*	

\* Coal dust was classified with coal from 1916.

NOTE.—These figures were given in the U.S. Commerce Report, 29th January, 1921, p. 568, and probably include a negligible production of coal and lignite in European Turkey.

**NETHERLANDS EAST INDIES.\***

†There are numerous coal deposits throughout the whole Archipelago, and the coal is worked chiefly by the State, but also by private enterprise. There are three State-owned collieries—the Ombilin mines near Sawah Loento, in the Padang Highlands, Sumatra; the Poeloe Laoet mines on the island of that name, off the south-east coast of Borneo; and the Boekit Asem mines about seven and a half miles south-east of Moera Enim, in the residency of Palembang, Sumatra. The last-named colliery was taken over by the State in 1919.

In 1919, the three State-owned collieries named above produced 739,475 tons of coal out of a total production in the Netherlands East Indies of 853,680 tons, or nearly 89 per cent.

The Ombilin mines are connected by a transport railway, about 97 miles in length, with the harbour of Emmahaven, which was specially constructed for the export of coal. The coalfield is about six and a quarter miles in length and five and a half miles in width, and the thickness of the seams varies from 19 ft. to 75 ft. It is estimated that the field contains about 190 million tons of marketable coal. The mines are worked largely by convict labour and supply 50 per cent. of the coal required by the Netherlands East Indian Government.

The Poeloe Laoet mines were taken over by the State in 1913. They are connected with the port of Stagen by a railway about three miles in length. This port is on the direct route of the shipping lines between Java, Macassar, China and Japan.

The Boekit Asem coal is said to be of good quality, containing from 1·2 to 3·0 per cent. of ash. The mines are connected with the port of Palembang by the South Sumatra Government Railway.

\* Year Book of the Netherlands East Indies, 1920.

† Foreign Office and Board of Trade (London), Department of Overseas Trade; British Commercial Agent to the Netherlands East Indies, 1921.

In addition to the State-owned collieries, there is a number of coal mines and coal concessions in the Netherlands East Indies which are in course of development, and the Government is actively constructing roads, railways and harbours to facilitate their working.

The following is a list of the better-known privately owned fields which have reached their producing stage, with their production in 1919 :—

	Production in 1919
	(long tons).
<i>South and East Borneo :—</i>	
Oost Borneo Maatschappij ... ...	36,077
N. V. Steenkolen Mij., Parapattan ...	41,087
Loa Boekit ... ... ...	21,065
Toeajan ... ... ...	4,847
Gg. Batoe Besar ... ... ...	1,740
Zuid Borneo Mij. (Gg. Koepang) ...	1,495
Handel en Landbouw Mij., Teweh ...	<u>5,850</u>
<b>TOTAL</b> ... ...	<b>112,161</b>

*Sumatra, West Coast :—*

Boekit Doerian ... ... ...	246
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*Celebes.\**

† Coal is worked in Menado, and occurs in varying quantities in most parts of south-west Celebes. Along the west coast at Maros, and east of the Pangakadjene line, there is a seam of coal, 1 foot 8 inches in thickness, and there is another at South Boni, but, besides being thin, these seams are poor in quality. In the Kantisang district, two seams are known, 4 feet 10 inches and 1 foot 8 inches in thickness, respectively. These coalfields are in a good situation, being close to a very level and wide road, running between Kassi and Macassar-Pangakadjene. In the Tondong Koerah district there is a thickness of 4 feet 10 inches of good workable coal. The Podo coalfield, the best field in the Tanette district, lies on the western side of the mountain range, nearly 200 feet above sea-level, and can be reached from Tanette by a fairly good country road.

*Production of Coal in State Collieries in Dutch East Indies.*

Year.	Quantity (long tons).		
	Ombilin.	Poelo Laoet.	Total.
1913 ... ... ...	404,464	124,846	529,310
1914 ... ... ...	436,019	126,440	562,459
1915 ... ... ...	445,858	115,818	561,676
1916 ... ... ...	497,244	122,110	619,354
1917 ... ... ...	500,058	118,892	618,950
1918 ... ... ...	496,098	119,470	615,568
1919 ... ... ...	474,738	177,263	756,231†

\* Official Return furnished by the Colonial Department of the Dutch Government.

† Board of Trade Journal (London), Vol. CII, No. 1174 (1919), p. 705.

‡ This total includes 104,230 tons of coal produced by the Boekit Asem State Mines.

*Analyses of Coals of Netherlands East Indies.*

Localities.	Ultimate Analysis.						Coke.	Calorific value.
	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur	Moisture.		
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Cals.
1 <i>Sumatra.</i> —Soengei Doerian No. 1 ...	71·26	5·12	12·28	0·79	9·69	0·86	65·84	
2 " " No. 2 ...	76·05	6·42	12·46	0·41	3·87	0·70	66·57	
3 " " Sapan-Dalam ...	74·56	5·88	13·51	0·35	5·25	0·45	61·63	
4 " " A-seam Loento ...	73·68	5·60	14·01	0·45	5·39	0·87	57·45	
5 " " C-seam Sawah Rasau ...	71·53	5·26	13·34		7·80	2·07	59·06	
6 " " Ombilin ...	72·57	5·31	15·09		0·20	5·96	0·87	55·11
7 " " " ...	76·80				0·45	3·49	0·70	
8 " " Retch, Indragiri ...					4·48	11·75	4·03	50·00
9 " " Palembang ...						13·82	0·54	45·26
10 " " " (metamorphosed coal)						0·46	1·64	5,600
11 " " Rantau Forest Reserve ...	39·26 to 41·19		35·50 to 38·70	0·38 to 0·50	18·23 to 21·00	1·04 to 5·08	7·700	5,432 to 5,466
12 <i>Borneo.</i> —Poeloe Laoet (coal from Kota Batoe)	59·36	5·70			0·61	5·79	16·70	66·06
13 " " Poeloe Laoet (coal from Djilapet)	65·03	5·73			0·61	6·07	10·53	63·40
14 " " Pengaron ...	66·03	5·35	13·21	1·45	0·35	4·25	9·36	
15 " " Batoe Panggal, Kotei ...	60·01	4·40	17·19	1·73	1·70	10·40	4·00	52·90
16 " " Pelarang, Kotei ...					0·50	14·40	1·60	55·40
17 " " Goenoeng Damar, Kotei ...					1·96	13·21	2·42	56·20
18 " " Goenoeng Sawar, Kotei ...					0·32	17·76	1·51	
19 <i>Celebes.</i> —Tondong Koerah ...						8·00	10·00	45·00
20 " " " (refined) ...						2·00	15·00	60·80
21 " " Tanette (Podo coalfield) ...					3·00	1·80	11·18	6,000 to 7,300
22 " " Bodjong Manik ...	51·55	4·17	17·19	0·40	23·72	2·97	42·54	7,400
23 " " Sedan, Ngardang ...						11·00	2·75	
24 " " New Guinea.—Kararaboe ...						22·25	4·84	40·18
25 " Denambring ...					0·53	17·81	12·44	45·10

*References.*

- 1-5.—J. A. Hooze, R. E. Eethout and R. A. Van Sandick, Trans. Inst. Min. Eng. (London), 1891, Vol. III, pp. 323-358.  
 6, 8-10, 12-18, 22-25.—Coal Resources of the World, 1913, Vol. I.  
 7.—J. N. Bouquet, Bull. de la Société des Ingénieurs Civils, 1904, No. 1, pp. 445-448. Comptes Rendus Mensuels de la Société de l'Industrie Minérale, 1904, p. 582. Journ. Iron and Steel Inst. (London), 1905, p. 582.  
 11.—J. B. Scrivenor, Bull. Imp. Inst., Vol. X, p. 171.  
 19-21.—Board of Trade Journ. (London), 1919, Vol. CII, No. 1174, p. 705.

## FRENCH PACIFIC POSSESSIONS.

**New Caledonia.**

\*Coal has been found in the island of New Caledonia, but not as yet in paying quantities or of good quality, and there is considerable difference of opinion as to the prospect of finding better deposits. It would be to the advantage of the island if coal could be mined, as, at present, furnaces have to depend entirely on imported coal, which is, naturally, expensive.

In "Statistics of the Mining Industry of the French Colonies during the years 1912 and 1913," there is a reference (page 420), to beds of coal met with in the construction of a railway tunnel, but no coal production is given either for those years, or up to 1917, the latest year for which that statement has been published.

## GERMAN PACIFIC POSSESSIONS.

**New Guinea (Kaiser Wilhelms Land).**

(Now administered under Mandate by the Commonwealth of Australia.)

†Coal has been found at Nusa Valley, New Guinea, comparable in many respects with a Bochum gas coal, but yielding a great deal of ash and containing much hygroscopic water. On distillation, it yields 57·5 per cent. of pulverulent coke.

‡Three seams of coal, aggregating 11 feet 10 inches in thickness, have been proved near Cape Horna. Analyses gave the following results:—Moisture, 2·08 to 2·40 per cent.; ash, 2·74 to 4·07 per cent.; coke, 51·2 to 54·4 per cent.; and calorific value, 7,875 to 7,550 cals.

\* British Foreign Office Historical Handbook, No. 145 (French Possessions in Oceania), 1920, p. 36.

† Zeits. f. prakt. Geol., 1903, Vol. XI, pp. 28–33 and 193–202; 1906, Vol. XIV, pp. 73–81. Trans. Inst. Min. Eng. (London), 1903, Vol. XXIV, p. 713.

‡ Board of Trade Journ. (London), Jan. 22, 1920, p. 125.

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# IMPERIAL MINERAL RESOURCES BUREAU.

The following is a list of the Official Publications (all prices are net, and those in parentheses include postage) :—

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Part III	...	...	...	(1922)	"	3s. 6d.	(3s. 9½d.)
Part IV	...	...	...	(1922)	"	2s. 6d.	(2s. 7½d.)
Part V	...	...	...	(1922)	"	4s. 0d.	(4s. 2½d.)
Part VI	...	...	...				(in the press)
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Magnesite	...	...	...	(1920)	"	1s. 3d.	(1s. 4½d.)
Manganese	...	...	...	(1921)	"	3s. 6d.	(3s. 8½d.)
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